

# THE IRON AGE

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## Turbines for Niagara's High-head Plant

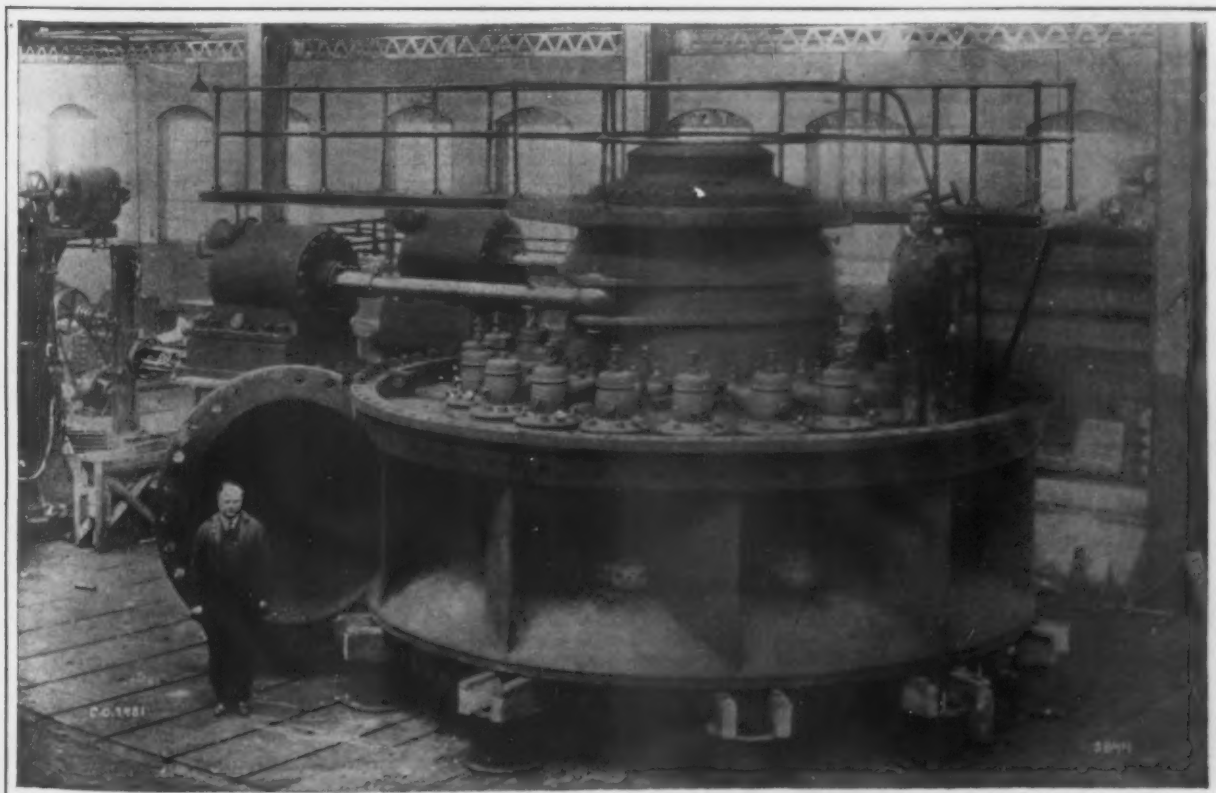
Monumental Size Prime Movers for Developing 70 Per Cent More Power for a Given Quantity of Water Than Now Obtainable

A NOTABLE addition to the hydro-electric installations at Niagara Falls is the construction of a new power plant that will eventually have six hydraulic turbines, each of no less than 60,000 hp. capacity. The plant is being erected by the Hydro-Electric Power Commission of Ontario. The normal operating capacity of these turbines will be 52,500 hp., as compared with a 37,500 hp. capacity in the largest hydraulic turbine units that are now being operated at Niagara Falls. The new plant is not only interesting from an engineering standpoint, but because of the immense size of the parts foundry and machine shop problems developed in connection with the building of the turbines themselves.

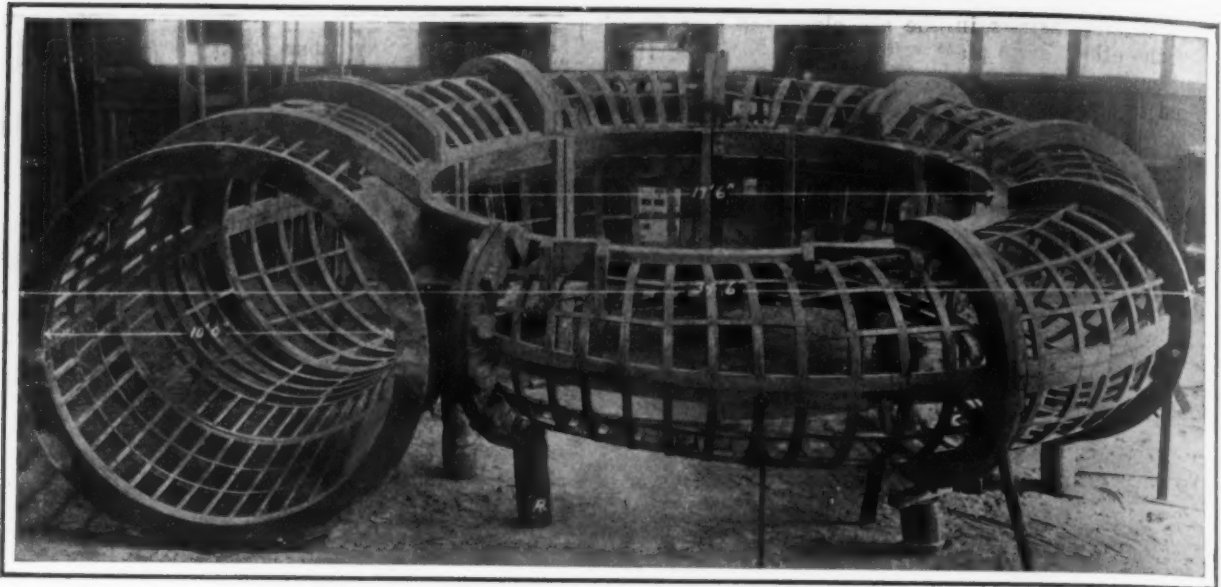
An important feature of this plant is the conservation of the water supply from the Falls, or getting more power for the same amount of water by increasing the effective head under which the water wheels work. With both the United States and the Dominion of Canada heading the general

public sentiment that the supply of water from the Falls for commercial power purposes be sufficiently restricted so that the grandeur of the Falls is not impaired, the hydraulic engineers took up the problem of getting the maximum amount of power from the water that is allowed to be taken from above the Falls.

The Hydro-Electric Power Commission now has control of the Ontario power plant at the foot of the Canadian Falls. This plant, which is the largest controlled by the commission, has 16 hydro-electric units with a capacity of 240,000 hp., at a head of 180 ft. The new plant is being erected at a point down the river, near Queenston, which will increase the net effective head on the turbines to 305 ft. and increase the power 70 per cent with the same amount of water as is used in the Ontario plant. The water for the new plant will be taken from the Niagara River at a point two miles above the Falls and up the Welland River a distance of four and one-half miles. This river is being dredged so that



One of the 52,500 Hp. Hydraulic Turbines, the Largest Ever Built. This shows the turbine erected in the shop with the casing removed



In Making the Cast Steel Sections of the Casing a Skeleton Pattern for the Entire Casing Was First Built and Then Separated Into the Nine Sections

its flow, which is now into the Niagara River, will be changed to the opposite direction. From the Welland River the water will be carried through a nine mile canal skirting around the corporate limits of Niagara Falls, Ontario, to the new plant, and will be discharged into the Niagara River one-half mile from Queenston. The canal will be 48 ft. wide and 35 ft. deep where it is cut through the rock, and 75 ft. wide and 35 ft. deep where it is dug through the earth. The plant will take water at practically the same elevation as Lake Erie and discharge it near the level of Lake Ontario. It is stated that this development will provide the most economical and efficient use of the available water at Niagara Falls.

The power house will be located at the foot of the cliff at the end of the canal, which terminates with a forebay in front of the intake gate house. The water will be conducted to each turbine through a plate steel penstock 14 ft. in diameter and about 450 ft. long. As the system which this plant supplies is one of the largest on the continent, the capacity of the units was made as great as present practice in hydro-electric units would warrant, in order to minimize the number of units.

Each turbine at full gate will develop 61,000 b.hp. at 187.5 r.p.m., and it is intended to operate each machine at 47,000 hp. to 55,000 hp. through which range the highest efficiencies occur. The weight of the turbine equipment will be 625,000 lb. exclusive of the governor apparatus. The turbines will be coupled to 45,000-k.v.a. vertical generators that are being built by the Canadian-Westinghouse Co., Ltd., Hamilton, Ont.

The first two turbines of this installation have been designed and are being built by the Wellman-Seaver-Morgan Co., Cleveland. Installation of new machinery was not required for this work, as this company has a plant well equipped to make the large castings and to machine the large sections required in hydro-electric units of this type. The casing for this first unit has been shipped and the shop erection of this unit is now under way.

The turbines are of the single runner vertical type with downward discharge into a single draft tube. The water will be distributed around the circumference of the turbine through a cast steel spiral or scroll casing having approximately circular cross sections. It will then be guided to the runner and the velocity increased through a cast steel speed ring and gates. The stationary vanes of the speed ring form the tie across the throat opening that extends around the inner circumference of the spiral casing to withstand the hydrostatic pressure inside the casing and also to transmit to the foundation part of the load of the concrete and generator above. The inlet diameter of the spiral casing is 10 ft. and the distance across the casing at the widest part is about 38 ft. From the center to the extreme edge of the inlet flange is 22 ft.

The casing was made in nine sections. When bolted together with the speed ring, the casing was subjected to a very satisfactory shop test of 260 lb. per sq. in. water pressure, which is over double the normal working pressure. Measurements taken during the test showed that all parts safely withstood this pressure without any excessive strains being set up in the castings or bolting.

The spiral casings are not quite as large as the two now used in the new extension of the Niagara Falls Power Co.'s plant, these being 10 ft. 6 in. and a third 11 ft. in diameter at its inlet, but these were designed to withstand only a 214 ft. head as compared with the 305 ft. head in the new plant.



The Runner Is Cast in One Piece 125 In. in Diameter and Weighs 33,000 lb.

Two of the casings in the old plant are cast iron and the other, steel plate. However, because of the higher head and the greater pressure it was decided to use cast steel casings for the new installation.

The spiral casing weighs 220,000 lb. and the largest of its nine sections weighed 37,000 lb. after the casting had been cleaned. In thickness the casing ranges from  $2\frac{1}{4}$  to  $2\frac{1}{2}$  in. One section is a complete cylinder, the remaining sections having an opening on the inner side, in which the speed ring sets. Starting at 10 ft. inlet diameter the sections of the casing are gradually reduced in size to keep the water at a uniform velocity as it passes around through the casing.

In order to secure castings that would safely withstand the required pressure test the various sections were cast on end so that all impurities would float into the risers, leaving the metal perfectly sound. Some difficulty would probably have been experienced in keeping the core from floating were the molds made horizontally, but this was avoided by making the castings in an upright position, the core being secured in place by rods. A skeleton pattern for the entire casing was first built and after completion was separated into the requisite nine sections. The molds were made in green sand with a green sand core. Special 4-part cast steel flasks, consisting of the cope, drag and two cheeks, were used, some of the flasks being 13 ft. 6 in. inside diameter.

In making the mold the skeleton pattern was set in an upright position and temporary sheeting fastened to the outside to hold in the sand. The core was rammed and the thin sheeting removed and the sand smoothed down to conform to the outside of the skeleton pattern. Paper was then placed around the outside of the core and pattern, and the flask set in place and rammed. The flasks were then removed and the surplus sand in the openings of the pattern struck off to conform to the size of the inside of the pattern. The core and flask were dried out to insure a hard surface for the mold. The flasks were arranged with a parting midway of the height of the mold to facilitate removing and

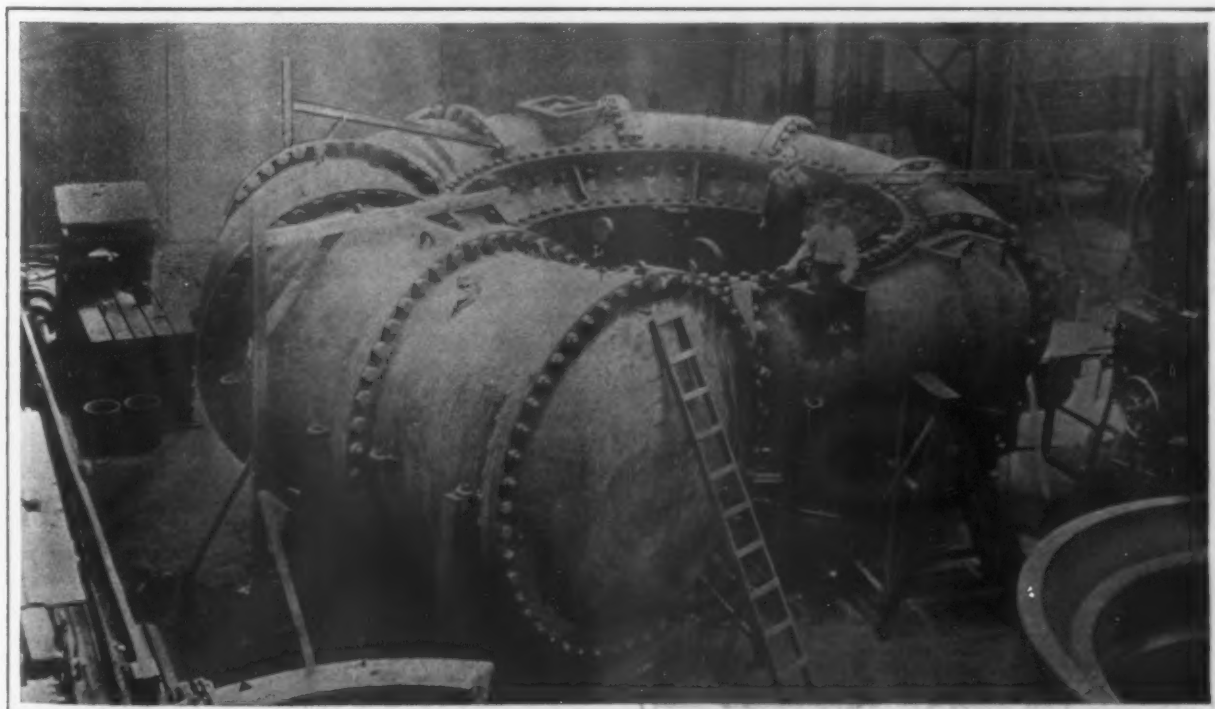


One of the Casing Sections as It Came From the Mold. This illustration indicates the size of the risers

replacing them. The castings obtained were uniform in thickness and exceptionally sound in every respect.

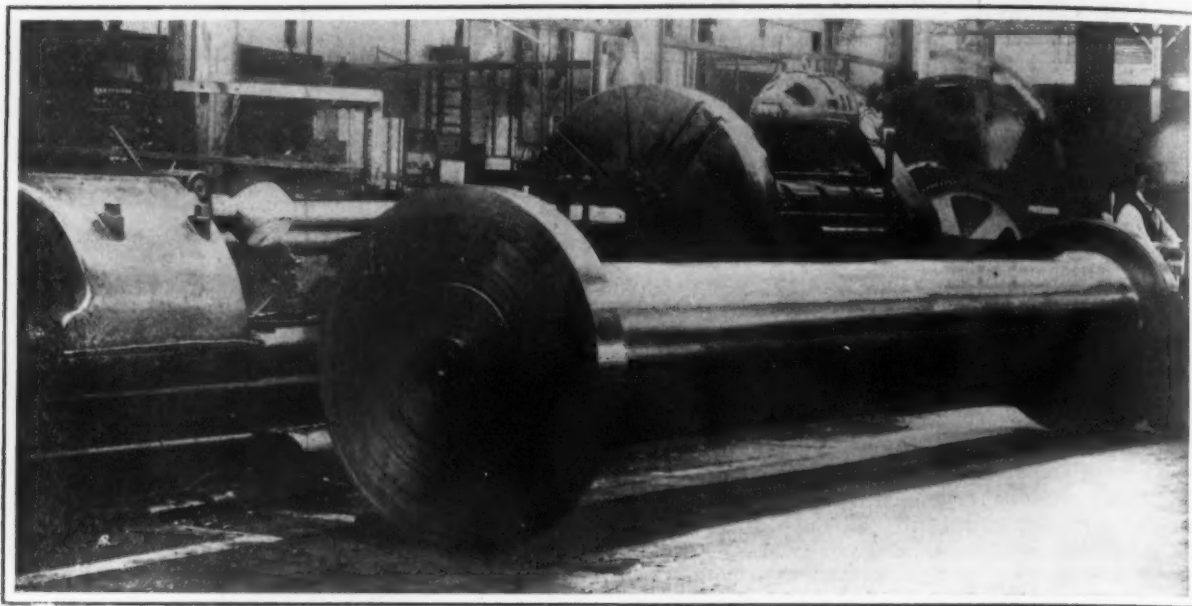
The mold was gated on two sides at the bottom, the gates being 3 in. in diameter, and the metal was poured from a 20-ton ladle. The largest sections had six 11-in. risers on the flange of the casting, these being sufficient in size and number to take all the impurities from the metal.

The casing was made from basic open hearth



The Cast Steel Spiral Casing Erected in the Shop for Pressure Test. This surrounds the turbine, water being distributed around the circumference of the turbine through the casing. The casing is cast in nine sections and weighs 220,000 lb. Its size is indicated by the diameter of the inlet section, which is 10 ft.





The Main Shaft, 31 In. in Diameter and 22 Ft. 3 In. Long, One of Its Flanges Being 51 In. in Diameter, Is Forged from a 63-In. Octagon Ingot Weighing 122,000 Lb. It is hollow bored and weighed, when finished, 54,200 lb.

steel running from 0.26 to 0.30 per cent carbon. The test of the metal showed a tensile strength of from 70,000 lb. to 85,000 lb. per sq. in., and an elastic limit of from 40,000 lb. to 52,000 lb. per sq. in., the average being 74,500 lb. tensile strength and 46,000 lb. elastic limit. The average elongation was 27 per cent and contraction 39 per cent. Two typical heats analyzed as follows:

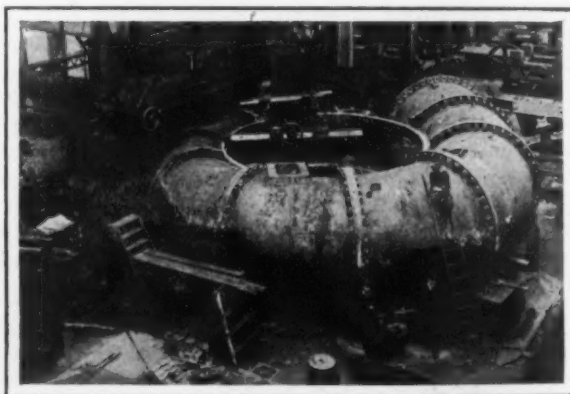
No. 1 carbon, 0.28 per cent; silicon, 0.33 per cent; sulphur, 0.026 per cent; phosphorus, 0.028 per cent; manganese, 0.44 per cent.

No. 2 carbon, 0.30 per cent; silicon, 0.42 per cent; sulphur, 0.02 per cent; phosphorus, 0.02 per cent; manganese, 0.49 per cent.

To facilitate the machining of the individual sections of the casing at the radial joints, six of the sections were designed to subtend an angle of 36 deg. This permitted each of these sections to be set up on an inclined fixture on a vertical boring machine, so that the upper surface could be faced horizontally, the casing then being turned over and the other side faced. The boring machine used was of special design, having a table 18 ft. in diameter and with housings and guides that can be moved back, permitting the table to take work up to 32 ft. in diameter, and from 9 ft. to 12 ft. in height. One section, called the "make-up" section, had an angle of 72 deg. between the faces of the two flanges. Because of this angle and the length this piece could not be set up like the other castings and these flanges were machined on a horizontal boring machine. The flanges of this section were machined fairly accurately and after the

other sections were assembled the "make up" section was then put in place to determine how much additional machining was required on the flanges to make this section match up at the joints. When the individual castings were assembled it was found that the castings were so true to pattern that they came to within  $\frac{1}{8}$  to  $\frac{1}{16}$  in. of matching up on the inside at the joints.

When the first section was machined it was

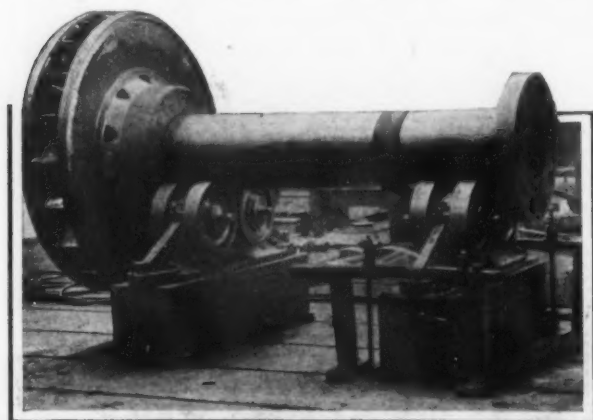


The Inner Faces of the Casing Were Machined on a Vertical Boring Machine with the Assembled Casing Stationary and the Tool in Motion, the Tool Post Being Bolted to the Table

found that there was some deflection of the sides of the circular casing due to its own weight because of the opening provided for the speed ring. Consequently ties were cast in the other casings, these ties being cut off after machining.

After facing the ends the flanges were drilled with a post drill, a temporary platform 6 ft. in height being built around the casing so that the drill operator could reach the work. After drilling, the sections were bolted together with  $3\frac{1}{2}$ -in. carbon steel bolts and the assembled casing was set up on supports around the table of a large vertical boring machine. The vertical housings of this machine were moved back and the tool post bolted to the table to machine the inner faces of the casing to which the speed ring is bolted. With this arrangement the tool was in motion and the work remained stationary while performing these facing operations.

One of the runners for these turbines is shown in an accompanying illustration. It is made of steel cast in one piece, .125 in. in diameter, and



Testing a Small Runner for Dynamic Balance. When running at 500 r.p.m. no vibration could be measured



weighs 33,000 lb. Extreme care was taken in setting the cores for this casting as the water passages and vanes must be uniform, smooth and true to design in order to secure high efficiency and to preclude corrosion. These runners when completed are accurately balanced and great care was required in truing up the runner and shaft to insure perfect operation.

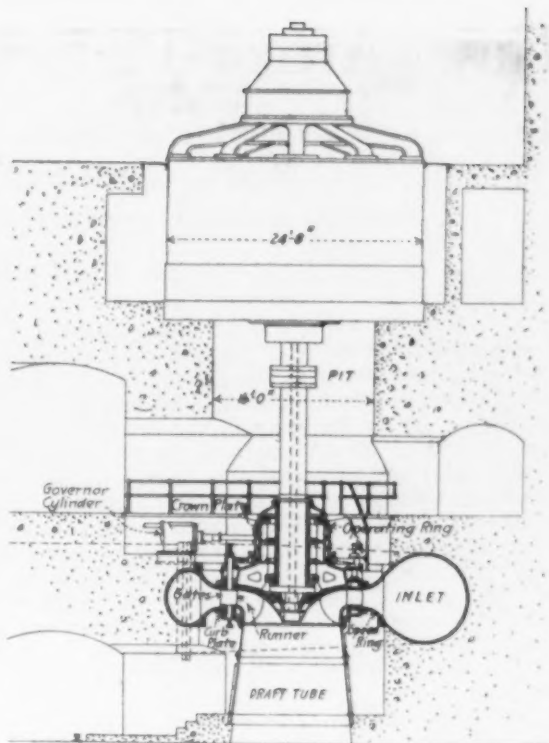
The turbine is so designed that the runner may be disconnected from the flange coupling of the end of the main shaft and removed from below the turbine casing without dismantling the generator or disturbing the alignment of the unit.

The main shaft at the coupling end is 30 in. in diameter and through the bearing it is 31 in. in diameter. It is hollow bored to 8 in. diameter throughout its length of 22 ft. 3 in., in order to pass a cable through for handling the runner and removable draft tube when dismantling by use of the crane in the generator room. The flange of the main shaft is 53 in. in diameter at the generator coupling and 51 in. in diameter at the turbine coupling, and it was necessary for the Midvale Steel & Ordnance Co., which furnished the shafts, to forge them from 63-in. octagon ingots weighing 122,000 lb. The finished shafts weigh 54,200 lb.

The gates are steel with the stems cast integral and are machined all over, which insures a proper guide for the water with a minimum of friction. The cast steel levers on the ends of the gate stems are connected to the cast steel operating ring by cast iron links. These links are designed to break before the elastic limit of any of the other parts of the gate mechanism is reached.

Two 24 x 15-in. governor cylinders, bronze lined to prevent rusting, are used to operate the gates of each machine. They are connected to the operating ring by piston rods  $6\frac{1}{4}$  in. in diameter. The operating fluid for the governor pressure system will be a mixture of water and a small amount of oil. In case of emergency the governor system can be connected through strainers to penstock pressure.

Every hydraulic feature was carefully studied to develop the highest attainable efficiency. In the mechanical design the aim was to obtain strength,



Arrangement of the Turbine Unit in the Power House

ruggedness and simplicity throughout to insure satisfactory and continuous operation. Completely erecting the turbine in the shop will preclude any unnecessary fitting or machine work in the field.

The Marietta Mfg. Co., Point Pleasant, W. Va., recently secured the contract for the construction of three steel hull towing steamers for service on the Magdalena River, Colombia, South America. Two of the steamers will be 180 ft. over all and 40 ft. beam, while the other will be 100 ft. over all and 26 ft. beam. They will be of stern wheel type, equipped with double compound condensing machinery and Western Rivers boilers, all of the company's own design and manufacture. They will be built complete but not riveted up and will be shipped knocked down to the seaboard and then reshipped to South America. The boats were designed by M. H. Pagenhardt and the order for them was placed by W. B. Elsworth, Standard Oil building, New York.



After the Casting Was Made the Flanges of the Casing Section Were Faced by Being Set on an Inclined Fixture on a Very Large Boring Machine, Having a Table 18 Ft. in Diameter

At the Left, Mold and Core for One of the Casing Sections



# Navy Armor-Plate and Gun-Forging Plant\*

Built and Operated by the Government at  
South Charleston, W. Va.—H-Type Forge  
and Furnace Building Among Unique Features

—BY ROGER M. FREEMAN†—

ON Aug. 30, 1917, ground was broken at South Charleston, W. Va., for the construction of a projectile plant as the first unit of the U. S. Naval Ordnance Plant. The main advantages of South Charleston lay in its being in the center of the rich coal districts of West Virginia, in the proximity of iron mines and blast furnaces, and in the availability of natural gas and oil. The reservation consists of somewhat over 200 acres of land located between the Chesapeake & Ohio Railroad and the Great Kanawha River about five miles below Charleston, at South Charleston, W. Va. It is divided into a north unit of approximately 40 acres and a south unit of approximately 160 acres, by Eighth Avenue, which is the main road and which carries the trolley line between Charleston and St. Albans.

The projectile plant, which occupies the north unit, was completed and put into operation in the spring of 1918, since when it has operated satisfactorily, producing principally 6-in. gun forgings, 16-in. armor-piercing projectiles, steel ingots up to 18 tons, etc., and at the present time the entire demand of the Navy Department for armor bolts. The projectile plant cost about \$2,000,000 and consists principally of a forge and foundry, approximately 130 x 560 ft., containing three 6-ton Heroult electric furnaces, two 60-in. cupolas, a small brass foundry, a 3000-ton press and a 500-ton press, 11 forge and five regenerative Carbottom annealing furnaces; a machine shop, 140 x 400 ft., completely equipped for machining minor-caliber gun forgings, large projectiles and general machine-shop work, and a heat-treatment shop, 92 x 153 ft.

In June, 1918, it was decided to vigorously push the construction of the main plant for the production of armor plate and major-caliber gun forgings. It was decided that due to existing conditions in the material and labor markets, the impossibility of writing specifications and getting lump-sum bids without great delay, and on account of the general disrepute into which cost-plus contracts for Government plant construction had fallen, the work should be done directly by the Navy. A construction division was organized and construction work was under way by Oct. 1, 1918.

The armor-plate and gun-forging plant has been designed to produce armor plate of the heaviest type, completely finished, ready to attach to battleships, and major-caliber gun forgings, up to 20-in., 50-caliber in size, rough-machined, which will be sent to the Washington Navy Yard for finish-machining. It will employ about 3000 when completed and in full operation.

The United States Naval Ordnance Plant is not a "war plant" in the modern usage of the term, but a permanent Navy institution which is abundantly justified for the following reasons:

First, additional capacity for the manufacture of armor plate and gun forgings has been provided.

Second, cost of armor manufactured by the Naval Ordnance Plant should be less to the Navy than the price now paid to commercial manufacturers and will afford a definite means of determining what the fair price for armor and gun steel to be paid steel manufacturers by the Navy should be.

Third, the Naval Ordnance Plant will be a large-scale experimental and research laboratory which can continually strive to improve the product and simplify manufacturing methods. In this connection it is interesting to note that the first group of 16-in. armor-piercing

projectiles made at the Naval Ordnance Plant passed the test at Indian Head and that the plant is successfully making air flasks for torpedoes.

Fourth, a very great additional advantage in the Government-owned and operated plant is the fact that improvements in product or methods can, when desired, remain the property of the United States.

## General Layout of Plant

The general layout of the south unit was determined first by the requirements of manufacture in modern straight-line methods, and secondly by the topography of the site. The four main buildings, namely, the open-hearth, the forge and furnace, the machine shop, and the gun-treatment building are arranged in parallel on a shuttle track which runs at right angles to the major axes of the buildings and connects them all together. This track will be the backbone of the manufacturing processes. All main buildings have been placed so that future expansion to double the capacity of the plant may be readily made.

Scrap and pig iron will be received from the Chesapeake & Ohio Railroad, at the southeast corner of the reservation, sorted from other incoming material in the classification yard, and stored in the stock yard alongside the open-hearth building. Steel will be melted in the open-hearth furnaces, refined in the electric furnaces, and cast into ingots in the pouring pit in the open-hearth building. From there the ingots will be transferred to the forge and furnace building, by way of the shuttle track, for heating, preparatory to forging into armor plate or guns under the presses located in the center of the forge and furnace building. The armor-plate forgings will then be carbonized, annealed, tempered, hardened, and ultimately sent over to the machine shop on the shuttle track where the armor plate will be machined and finished, ready for attaching to battleships. Gun forgings will be green-annealed in the south aisle of the forge shop, sent to the north aisle of the machine shop for rough-machining, and thence to the gun-treatment building for heat treatment prior to shipment to the Navy Yard in Washington for finish-machining and assembling.

The service building, which comprises the main electric substation, the air compressors, the water supply distribution pumps, and the boiler plant, which provides steam for the steam-intensified hydraulic presses and for heating the machine shop, are located as nearly as possible to the center of gravity of their respective loads.

Twin buildings, one of which will be used for general stores and the other for the blacksmith shop, pattern and templet making and storage, have been located in the southeastern portion of the south unit accessible to the railroad system and the forge shop.

The maintenance shops, in which the electricians, pipefitters, riggers and carpenters are to be located, and the locomotive repair shop and roundhouse, will be combined in one building at the approximate center of the reservation.

The western portion of the south unit as divided by the main railroad track running north and south, contains a large storage yard and the "skull cracker."

The reservoir and settling basin for the industrial water supply system has been made by throwing two earth-filled dams across the western end of the valley which cuts diagonally across the reservation.

An administration building of sufficient size to house the executives for the entire ordnance plant was built at the same time as the projectile plant and located in the south unit on Eighth Avenue. The balance of the frontage on Eighth Avenue is occupied with temporary

\*From a paper to be presented at the annual meeting, New York, Dec. 7 to 10, of the American Society of Mechanical Engineers.

†Supervising engineer in charge during design and construction of the Naval Ordnance Plant.

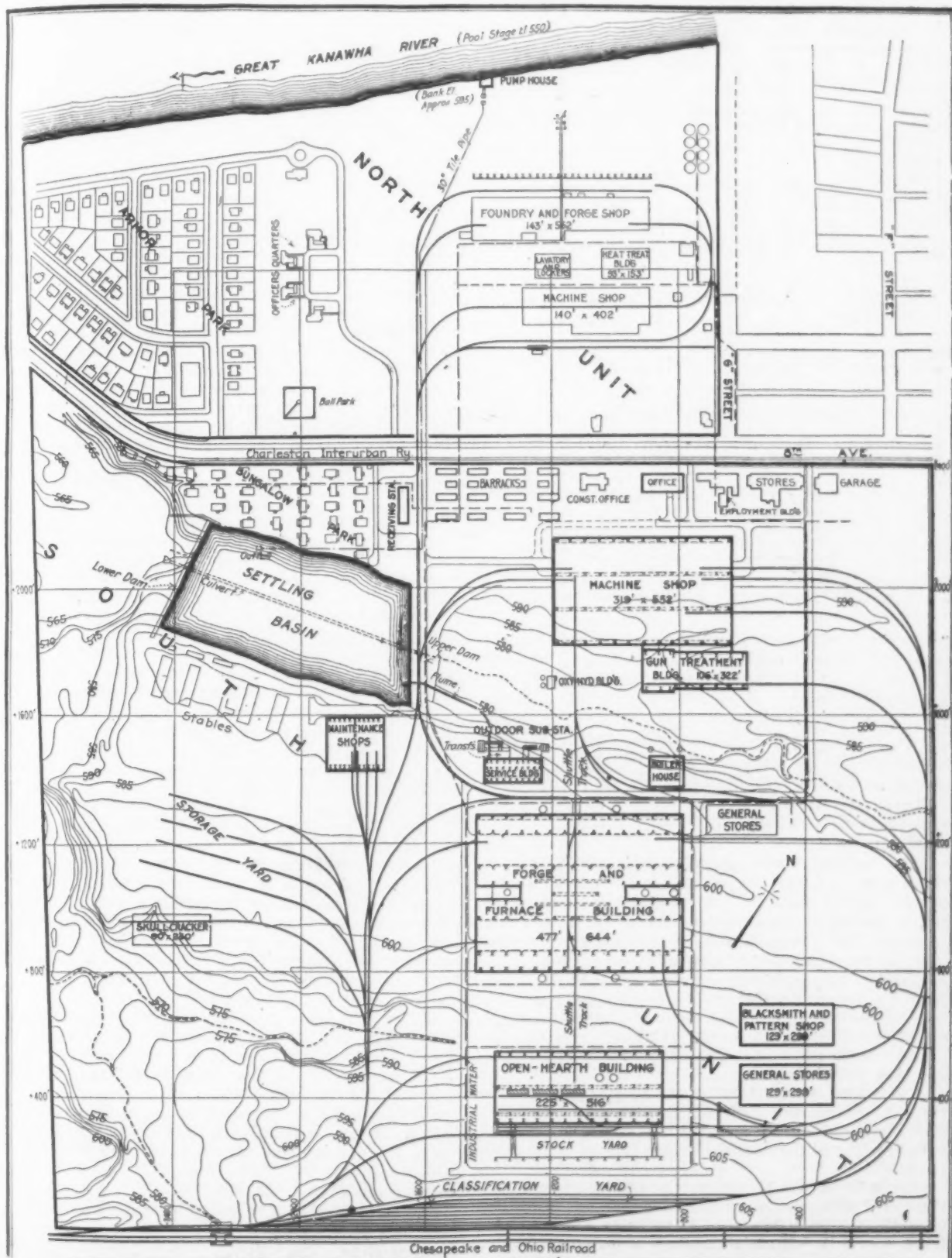
buildings for construction offices, stores, the garage, barracks to house about 100 men on construction work, and Bungalow Park, in which 32 bungalows were erected for the occupancy of the supervisors of the construction division.

In general, the buildings consist of a structural-steel framework, unusually heavy on account of the size of the cranes on concrete foundations, some of which contain upward of 200 cu. yd. of concrete inclosed by walls of specially designed hollow red tile building block, 5 x 12 x 8 in. Fifty per cent or more of the surface area of the walls is steel sash. The roof decks are of gyp-

sum composition, cast in place and covered by waterproof roofing. In round numbers about 50,000 cu. yd. of concrete has been placed in the various foundations, 25,000 tons of structural steel erected, and in excavation and grading upward of 500,000 cu. yd. of earth moved. The total area under roof is approximately 700,000 sq. ft. for the main buildings alone.

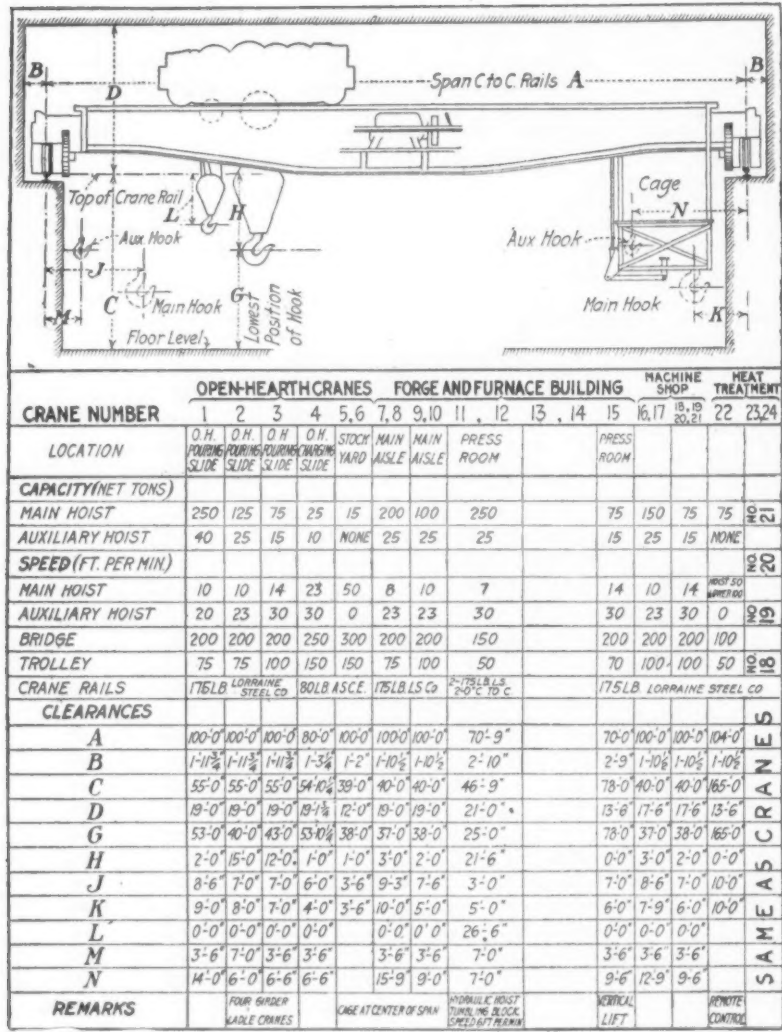
### Transportation Facilities

It was evident very early in the design period that one of the most important features of the entire plant would be the arrangement for efficiently handling and



Two-Hundred-Acre Naval Ordnance Plant at South Charleston, W. Va. Modern straight line methods of manufacture were employed in the layout; the four main buildings, i.e. open hearth, forge and furnace, machine shop and gun treatment building, are arranged in parallel on a shuttle track which runs at right angles to the major axes of the buildings and connects them all. The railroad system totals over seven miles in length and provides 10 tracks for the classification yard.





Specifications of Cranes Installed in the Open Hearth, Forge and Furnace, Machine Shop and Heat Treatment Buildings

moving unusually heavy and awkward loads. For example, one armor-plate ingot which will be made about six times a year will weigh upward of 400,000 lb., and tube forgings for the major-caliber guns will weigh up to possibly 100,000 lb. and run in length up to nearly 100 ft. An armor plate in the making must be handled something like 50 separate times, and as the average weight of the finished plates is in the neighborhood of 50 tons, very special attention was required in the design of the electric traveling cranes and in the railroad-track system.

The railroad system, which totals something over seven miles in length, is outlined in the accompanying general layout diagram. A classification yard of 10 tracks including incoming and departure tracks has been provided. Provisions have been made for tracks entering into either end of practically every crane aisle. A complete loop-within-loop system has been developed so that a wreck or stoppage on any main track will not hold up the operation of the plant or of any individual major building. A three-way reinforced-concrete approach trestle will lead to the charging floor level of the open-hearth building.

The major specifications of the 23 overhead electric traveling cranes are given in an accompanying table. Each main aisle of the four main buildings is provided with erecting girders for the cranes located in the roof trusses.

While by far the larger portion of the traffic at the plant will be by rail, a system of concrete roads 20 ft. in width has been developed in order to provide auto-truck service to all main buildings and for employees. The main entrances to both the north and south units will be from Eighth Avenue, where the plant railway crosses. A central receiving building with a special siding has been built near this point for the unloading

of less-than-carload shipments and to permit distribution by auto truck.

Open-Hearth Building

The unusual features of the open-hearth at the Ordnance Plant consist of the arrangement of the stock yard alongside the building, the 100-ft. wide pouring aisle with exceptionally heavy cranes, the arrangement for "duplexing" by placing the electric furnaces in the pouring aisle and the dump trestle and storage bins in the crane-served charging aisle. The stock yard is 331 ft. wide by 516 ft. long.

The charging floor of the open-hearth building has been designed to withstand a load of 800 lb. per sq. ft. It extends 30 ft. out under the crane runway of the stock yard to form a charging platform. Two parallel tracks are arranged upon this charging platform with crossovers conveniently located, and a turnout leads to the charge track directly in front of the open-hearth furnace doors.

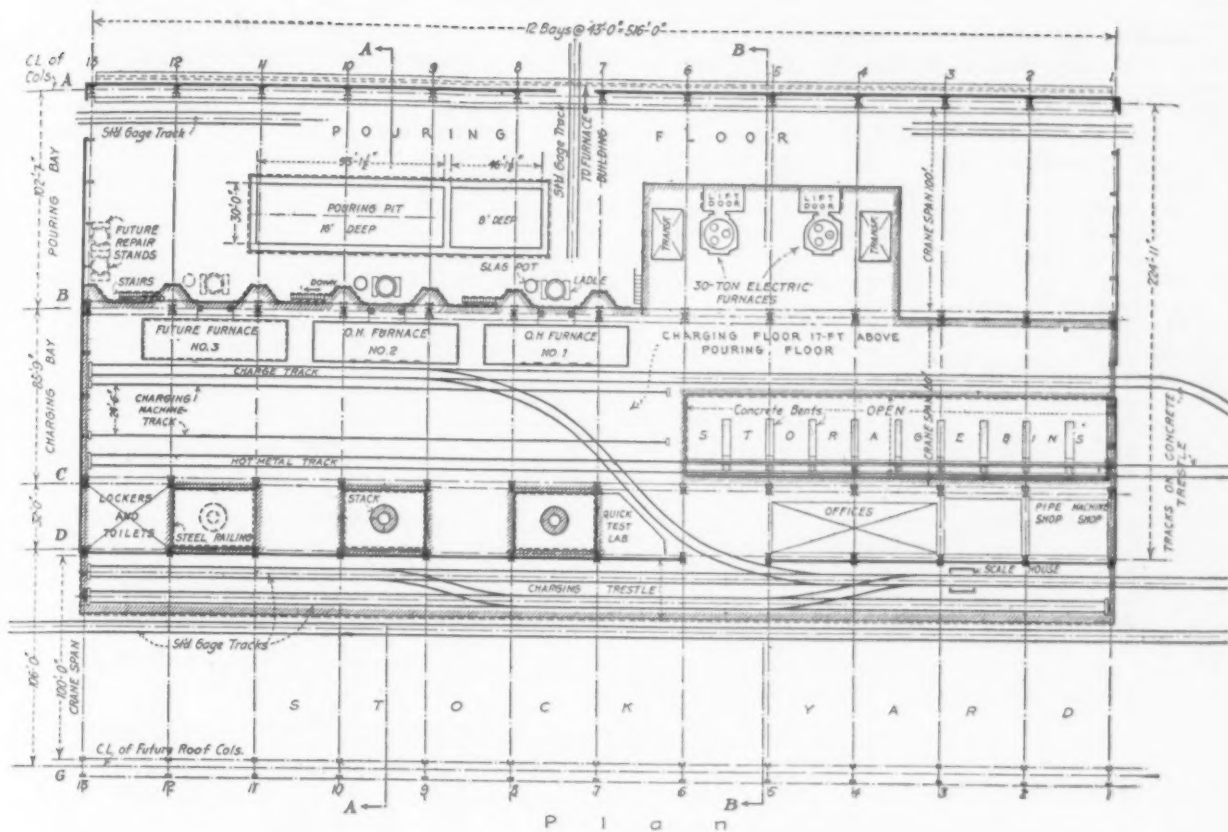
A track connected at both ends to the main system runs through the stock yard at the ground level adjacent to the charging platform. Materials for the charge, such as scrap, pig iron, etc., received on this track can be unloaded directly by the stock yard cranes by magnet and placed in charging boxes on charging cars on the charging platform. These cars will be made up into trains, each containing a complete charge for an open-hearth furnace, or the incoming cars of material may be unloaded directly into the stock piles. The charge train will be shifted by an electric storage battery locomotive over the scale, located near the entrance to the charging aisle, directly to the track in front of the open-hearth furnace doors and into position for the charging machine to start charging the furnaces. The empty train of charging boxes will be shunted back to the charging platform over the same track it entered, or out of the building at the east on to the trestle and back.

The charging floor carries three tracks, two of standard gage, which are connected into the 3-way approach trestle at the east of the building, and the third of 24 ft. 6 in. gage for the low-type charging machine. The floor is paved with brick. The charging track is located directly in front of the furnaces and the so-called "hot metal track" is at the far side of the aisle. This track originates in the approach trestle and continues at the east end of the building over a series of concrete bins arranged so that cars of material can be bottom dumped. The track then leads to the main charging floor, where it will be used for handling materials with which to repair the furnaces and thus avoid interference with operation.

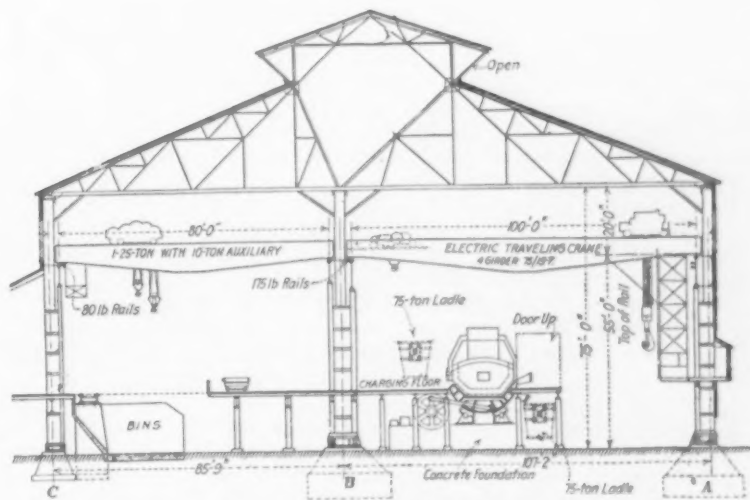
Space has been provided for three 65-ton open-hearth furnaces, two of which are now being completed. An electric traveling crane of 25 tons capacity with an auxiliary hoist of 10 tons capacity serves the entire length of the charging aisle.

Underneath the charging floor and back of the open-hearth furnaces is the pit for the checker chambers inclosed by a reinforced-concrete retaining wall. The lean-to contains the offices, the quick test laboratory, chimneys, storage areas, lockers, toilets, etc.

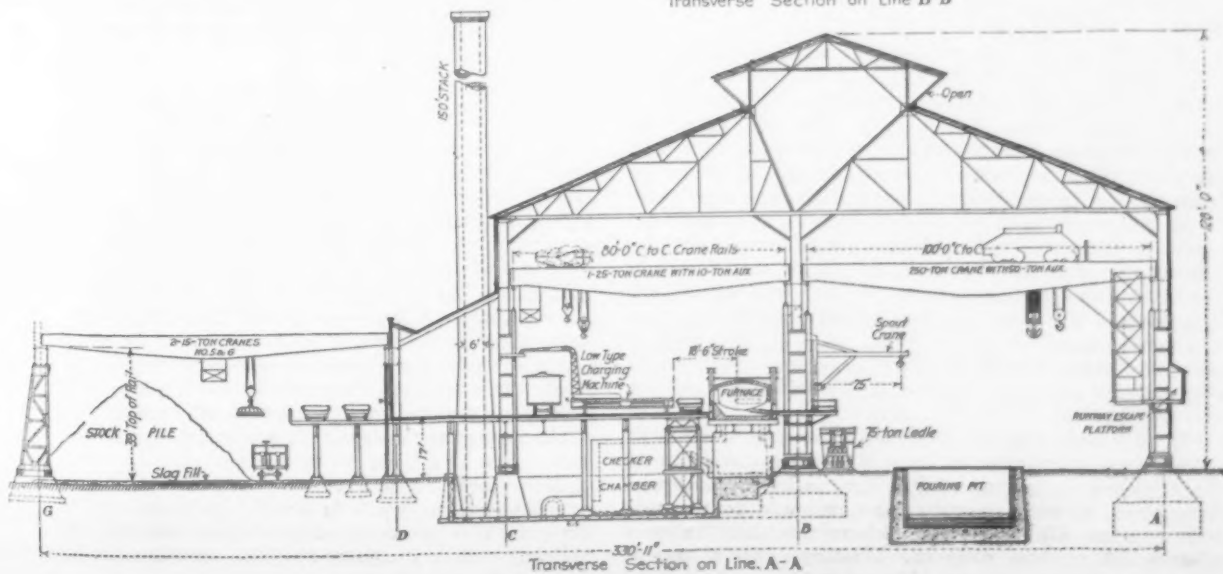
The pouring aisle is served by three electric traveling cranes, specifications for which are given in an accompanying table. The distance from the center to center of crane runway rails is 100 ft. Jib cranes of 6 tons capacity with a radius of 25 ft. are mounted on main building columns adjacent to the open-hearth furnaces for handling the spouts.



Floor Plan and Transverse Sections of the Open-Hearth Building. Unusual features include the arrangement of the 331 x 516-ft. stock yard alongside the building, the 100-ft. wide pouring aisle with exceptionally heavy cranes, the arrangement for duplexing by placing the electric furnaces in the pouring aisle and the dump trestle and storage bins in the crane-served charging aisle



Transverse Section on Line B-B



Transverse Section on Line A-A

The unusual width of the pouring aisle was to give space in the open-hearth building for the storage and chipping of ingots, and on account of the large pouring pit in which it is planned to ash-anneal the ingots. The location of the electric furnaces for duplexing in this aisle was an important factor in the determining of this width.

The pouring pit is divided for convenience in operation into two levels and is of reinforced concrete lined with 13 in. of red brick. The lower level is 16 ft. below the floor, 30 ft. wide and 93 ft. long, and the upper level is 8 ft. deep, 30 ft. wide and 46 ft. long.

For open-hearth steel the furnaces will be tapped into the ladles and carried directly to the pouring pit and bottom-poured directly into the ingot molds. In obtaining electric steel by duplexing, the open-hearth furnaces will be used simply for melting the charge, which will be tapped into ladles and then carried down the shop to charge the electric furnaces.

Two 30-ton Heroult electric furnaces have been erected on independent concrete foundations, and are surrounded by a charging platform which is an extension of the charging floor and on which are placed the transformer houses. Flux material will be brought over to this floor from the bins in the charging aisle. The furnaces will be charged from the rear. The capacity of one open hearth is sufficient to charge the two large electric furnaces. After the refining process, a

ladle will be brought close into the front of the electric furnace by lifting a large trap door, the furnace tilted forward and the contents discharged into the ladle, which will then be carried back to the pouring pit and the molten steel will be bottom-poured into ingots in the usual manner.

In casting the largest ingot, the open-hearth furnaces will be overloaded to 80 tons each and will be brought out at the same time as one or both of the 30-ton electric furnaces overcharged if required.

Tracks enter the pouring aisle at either end for a length of one or two car lengths and the south end of the shuttle track is at the middle of the building adjacent to the pouring pit, conveniently located for the transportation of ingots to the forge shop.

Attention is invited to the runway escape platform for the crane operators at the level of the bottom of the crane cages, also to the provision in the structural design for ventilation. The entire wall area of the building is left open to a distance 8 ft. above the ground, although arrangements are made for vertically lifting doors in case of severe weather. The sides of the large monitor are left entirely open and without louvers, high curbs being provided on the main roof and the overhang of the monitor roof being made excessive for protection against the weather.

(To be continued)

## RESTRICTIONS REMOVED

### Remnant of Open Top Car Order Vacated by Interstate Commerce Commission

WASHINGTON, Nov. 30.—Restrictions which have prevented the steel industry from getting an ample supply of open top cars for the movement of its products have now been lifted. What remained of the open top car order applying to coal was finally vacated by the Interstate Commerce Commission, effective Nov. 29. The only coal priority order now remaining in effect is one designed to insure a supply of coal for the Navy from certain mining districts.

The open top car order as it was in effect recently applied to the territory east of the Mississippi River and defined coal cars as those with sides 42 in. in height or more. Originally the height named was 38 in. and at one time the order applied to roads as far west as the Rocky Mountains.

In its order vacating the open top car regulation the commission said:

It appearing, That the emergency which caused the commission on Oct. 8, 1920, to make and enter its Service Order No. 20 and the amendments thereto made and entered on Nov. 6 and Nov. 15, has been measurably relieved:

It is ordered, That the said Service Order No. 20, as amended, be, and the same is hereby, vacated and set aside effective at midnight Nov. 29, 1920.

The lifting of this restriction which benefits the steel industry and also the building and road material industries was made possible by the rapid improvement in the coal situation.

At the same time that the open top car order was cancelled the commission gave authority to the railroads to do away with the reconsigning rules applicable on all freight in open top cars and coal and coke in all cars. Under these rules, which were put into effect as a means of securing a greater supply of cars for coal, more than one reconsignment of coal was prohibited except upon the payment of a penalty of \$10 per car. The wholesalers objected to the rules on the ground that it interfered with their business, but the commission and the railroads considered it justified during the summer months.

E. E. Clark, chairman of the Interstate Commerce Commission, in a letter to Daniel Willard, chairman of the advisory committee of the Association of Railway Executives, said inasmuch as the reconsignment rules were put into effect as an emergency matter, the commission believed that they should be cancelled with the passing of the emergency. The commission gave per-

mission to cancel them on not less than one day's notice.

The commission also has cancelled Service Order No. 21, which provided a system of moving coal to public utilities on special permits. In its vacation order, the commission declared that the emergency which caused the commission to issue the order on Oct. 8 had been measurably relieved. Service Order No. 21 was a substitute for Service Order No. 16, which gave blanket priority to the movement of coal for public utilities.

### Decreased Production

Production of bituminous coal fell below the 12,000,000 ton mark during the week ended Nov. 20 for the first time in several weeks. The total output, including lignite and coal coked at the mine, was estimated at 11,770,000 net tons. In spite of the decrease, production was well in excess of that of the corresponding week of any of the last four years.

Beehive coke produced during the week totaled 365,000 tons, a decrease from the revised figures for the preceding week of 15,000 tons, or slightly less than four per cent. The decrease was general except in the Western states, where no change was reported. Cumulative production for 1920 is now 18,819,000 tons, which compared with the production for the same period in 1919 shows an increase for 1920 of 1,443,000 tons.

With an estimated production of 1,975,000 tons, the output of anthracite for the week ended Nov. 20 was again back at normal. During the previous full time week, the output was 1,915,000 tons, or 60,000 tons less than the week ended Nov. 20.

### Double-Needle Torches

A double needle-point burner for blow torches has been developed by the Clayton & Lambert Mfg. Co., Knodell Avenue and Detroit Terminal R. R., Detroit. A new generator has been developed for use with the torch which will burn low grades of gasoline or kerosene or a mixture of both fuels in any proportion. The torches are for use indoors or for outside work. The two needles control the supply of fuel which enters the combustion chamber and enable the user to secure the size and quality of flame best suited to the work in hand. The torches are made in pint, quart and two-quart sizes and both with and without hook and support on the burner for holding the soldering copper.

The Barde Steel Products Corporation, New York, recently bought 400 tons of shipbuilding material at the plant of the Ames Shipbuilding & Drydock Co., Seattle, and it is being shipped to interests at San Pedro, Cal.



# Booth Rotating Electric Brass Furnace

Some of the Results Which Have Been Secured—New Features of Later Designs—Automatic Electrode Control

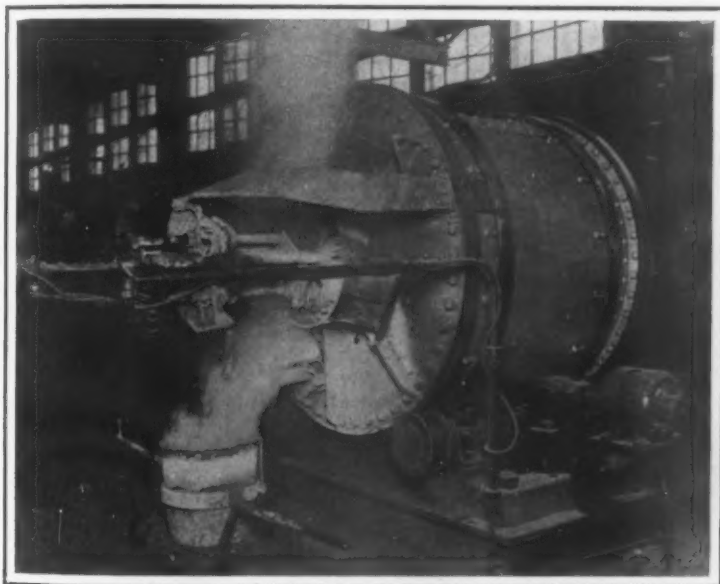
BY CARL H. BOOTH

THE Booth rotating electric furnace is in a field by itself when treating or melting finely divided material. Metallurgists have known for years of the difficulty of getting borings, grindings, turnings and powdered products to coalesce and melt. Without complete rotation the top layer of the material simply melts over, and each small particle of the charge seems to insulate against the passage of the heat, making necessary supplementary stirring, or secure the melt at a greatly increased loss. With the rotating action of the Booth furnace the charge simply has to turn over, exposing all particles of the heat, producing extremely rapid melting, and with low loss and power consumption. Since metals in this form can be purchased at the lowest possible cost, the Booth rotating

movements of the electrodes through the cooling collars are also tested out to see that they do not stick, and any loose slag left in the furnace after pouring the heat is removed.

The treatment of yellow brass borings being much the more difficult, the melting of other finely divided materials, such as red brass borings, turnings, skimmings, washings, etc., is very easily handled, with metallic shrinkage losses averaging not more than 1 per cent and power consumption even with small size furnace like the 500-lb. unit, averaging not over 350 kw.-hr. per ton, operating only one shift per day, and including all preheating.

Records recently made on a 500-lb. Booth rotating electric furnace at the plant of the Enterprise Brass



Pouring Position of the New Booth Rotating Electric Furnace at the Michigan Smelting & Refining Co., Detroit. The small motor directly above the ladle controls the electrodes

The Special Design (below) of the Refractory Lining Used in These Furnaces



electric furnace can show unusual economies when used on these grades of material.

Recent records obtained from the Prime Mfg. Co., Milwaukee, Wis., on its 500-lb. Booth furnace, which is used almost exclusively for the melting of yellow brass turnings and borings, pouring directly into castings, are as follows:

Pounds melted per day, one shift.....	3900 to 5500
Average daily output, lb.....	4950
Average charge per heat, lb.....	550
Number of heats per day.....	8 to 10
Number of hours power on furnace daily.....	10 to 11
Average melting time, min.....	40
Time between heats, min.....	15 to 25
Average power consumption per ton, kw.-hr.....	300

Lining (made of good grade of arch fire clay brick) has lasted approximately 500 heats, and is good for many more.

Electrode consumption per ton metal, under 6 lb.

No records as to net metallic shrinkage, exclusive of oil, dirt and moisture, are available, but tests made on the same type and analysis of material in other Booth furnaces show that this need not exceed an average of 2 per cent.

In melting yellow brass turnings and borings, after each heat, generally between ladles, as only a moment's time is required, all live parts of the furnace are carefully cleaned off with compressed air, which prevents any short circuiting due to deposits of zinc dust. The

\*From a paper presented at the annual convention of the American Foundrymen's Association at Columbus, Oct. 5 to 8. The author is president Booth Electric Furnace Co., Chicago. The original furnace was described in THE IRON AGE, June 26, 1919.

Works, Muskegon, Mich., melting red and yellow brass for castings, in the proportions of about two-thirds red to one-third yellow, show what can be expected when using the furnace on heavy metal:

Average pounds melted daily .....	4800
Average charge per heat, lb.....	600
Number heats per day, nine hours.....	8
Average power consumption per ton, kw.-hr.....	310

Records on the same size furnace at the plant of the Fulton-Harwood Brass Works, South Bend, Ind., are on the same basis, although their daily average requirements for metal are less. The charge consists of only virgin pig and their own foundry scrap. Considering the fact that this furnace is not being pushed to its capacity, the showing made is exceptional, and proves clearly the ability of the Booth furnace to operate on a low cost basis, even with a reduced day's operation.

Yale & Towne Mfg. Co., Stamford, Conn., recently completed thorough tests covering every phase of the operation of a 500-lb. furnace at its plant. A high pouring temperature is required, due to the light weight castings made, and likewise the time between heats is lengthened, since the metal is all taken in small pots. As a consequence it was necessary to keep the power on the furnace while pouring, which made the power consumption high and slightly increased the metal loss. There were other disadvantages in handling due to the location of the furnace in the foundry. When their

practice is thoroughly worked out much better records can be made.

It is significant to note that, even with a rate of power in practically all of these plants, of at least 2c. per kw.-hr., and occasionally up to 3c., the cost per ton of metal melted for electricity is no higher than present-day costs for coke, coal, oil and gas. As the use of crucibles for melting is eliminated with the Booth furnace, and the total upkeep and repair costs on this small 500-lb. furnace will not average over \$2 per ton of metal melted, which total is considerably lower than the cost of crucibles alone, the large savings made in metal losses and in labor show a handsome margin in favor of the electric furnace.

The brass foundry needs the small efficient melting unit. The mixtures required in the day's run are quite varied. Large heats cannot be handled to good advantage for many reasons, but principally because of the difficulty in keeping the metal up to temperature and the long shut-downs between heats. The records presented above show conclusively that it is practical to use a small arc furnace for intermittent daily operation, and secure cost records almost as low as with a larger sized furnace. And the overall result is superior, due to the greater flexibility in handling; the ability to make short heats; follow one heat of a certain mixture with another heat of an entirely different analysis; run, if necessary, only a few hours per day, but not at a heavy penalty in cost; use any grade of material from borings to pig metal and thus effect the maximum economy in metal used.

For the brass melter who has a large number of mixtures, or whose daily output is limited, a Booth rotating electric furnace of still smaller holding capacity can be obtained. This is known as the 250-lb. size. In the details of its construction it is identical with the 500-lb. furnace, and the power input is proportioned so that the same speed of melting results.

A recent day's run on a 250-lb. furnace at the plant of the Hill Pump Valve Co., Chicago, was as follows, all heats being red brass, 85-5-5-5:

Heat No.	Power		Kw.Hr. used	Weight of charge, lb.	Time between heats, min.
	On	Off			
1	6:00	8:35	125	346	..
2	9:00	9:58	50	348	25
3	10:22	11:25	52	351	24
4	11:48	12:50	52	340	23
5	1:15	2:15	50	362	25
6	2:40	3:40	53	384	25
7	4:07	5:00	48	371	27
			430	2502	

Average power consumption, 343 kw.-hr. per ton (no pre-heating required).

Notes.—On each heat from three to five minutes taken to skim through door. Zinc added at this time.

Metal used, old scrap copper (bearing blocks).

Pouring time, 10 to 12 min. between heats.

Remainder, clean electrodes and coolers, and charging furnace.

Nordyke & Marmon Co., Indianapolis, Ind., is using one of these 250-lb. furnaces for making its most difficult alloys and castings, including silicon bronze and other special mixtures. A considerable portion of the time the furnace runs for 16 hr. per day. Many heats of red brass on this basis have been made at the rate of 270 kw.-hr. per ton, which is a good record for a 2000-lb. furnace.

Unforeseen delays, due to the chaotic shipping conditions during the greater part of this year, have seriously delayed the placing in operation of the large Booth furnaces which have been under contract for many months. At the time this paper is being written only a few records on 2000-lb. furnaces are available, and these are taken from the furnace in operation at the plant of the Michigan Smelting & Refining Co., Detroit.

These data show that the same speed of melting is obtained with the large furnace as with the small sizes previously discussed. Mechanical methods are being worked out so that charging time will be cut down to a minimum, and practically all of the metal will be poured into one large ladle, and from that directly into the ingot molds. This means that it will be entirely

practical to average one heat of the rated holding capacity of the furnace per hour. "Power consumption on the first heat of the day—2000 lb. red brass ingot was 260 kw.-hr. per ton." To date, however, due to serious shortage of power in Detroit, and labor troubles, this furnace has not been put into production, and a real statement of what it will do cannot be made. The indications are that it will keep up the good records made by the smaller sizes.

One illustration shows a photograph of this 2000-lb. furnace at the plant of the Michigan Smelting & Refining Co., pouring yellow brass after melting a charge of yellow brass turnings and borings, containing nearly 4 per cent of oil. Note at the left center the motor used for automatically controlling the operation of the electrodes. This is the first electric melting furnace of the indirect arc, drum-type method of construction to be equipped with automatic electrode control.

All Booth rotating electric furnaces are designed so that automatic control of the electrodes can be used. This feature soon pays for itself in saving in labor cost, especially when more than one furnace is installed. A small ¼-hp., direct current, ball-bearing motor, controlled by a standard General Electric or Westinghouse control panel comprises the equipment. Either 220 or 110-volt direct current can be used.

One of the chief objections to the arc type of electric brass melting furnace had been the higher labor cost required, due to the necessity for hand control of the electrodes; but the absolute assurance of securing with all Booth furnaces automatic control of electrodes puts Booth equipment in a class by itself. In addition to the large saving in labor cost over furnaces not so equipped, the rheostat control feature offers a positive method for regulating the temperature, which proves of great value when melting low temperature alloys—especially in the case of aluminum.

It will be noted that the number of heats per 9-hr. day will average eight in yellow brass and seven on red brass; in each case the charge being about 20 per cent heavier than the rated holding capacity of the furnace. This will work out uniformly for all sizes. It is also entirely practical, from these data, to make a reasonable estimate as to what the Booth furnace will do on a 24-hr.-day schedule, if operated on the same basis of efficiency.

There are many distinguishing features about the Booth type of indirect arc furnace, wherein it differs from other equipment, among which are the following:

Moving contact method of carrying electricity—no swinging cables; friction drive; one-piece cast-iron base; water cooling; simplicity of lining (the illustration shows this); even heating of the metal; superior mixing of metal by rotation; economy in handling; direct pouring from furnace; interchangeability of furnace shells, and high-grade construction.

### Students in Westinghouse Shops

In order that engineering students of the University of Pittsburgh and the Carnegie Institute of Technology may be able to gain practical knowledge regarding the production and testing of electrical apparatus, and at the same time earn money, the Westinghouse Electric & Mfg. Co., East Pittsburgh, has initiated a part-time employment plan. Students are allowed the regular hourly rate of work on Saturday afternoons, Sundays and holidays. For the most part, the employment consists of storekeeping, which allows the students to become familiar with the size and character of the different kinds of electrical apparatus.

Falling off in freight business is given as the reason for laying off a considerable number of men by railroads operating in the Cincinnati district. The Big Four Railroad has reduced its force of maintenance of way men approximately 10 per cent, and since Oct. 1 has laid off about 20 per cent of the shopmen on the payroll during the period of Federal control. The B. & O. has also reduced its forces in the Cincinnati district, those reductions coming in shops, stores and passenger train yards.

# Comparative Values of Motor Valve Steels\*

## Analysis of the Effects of High Temperature on Physical Properties of Tungsten, Chrome and Nickel Steels

—BY G. GABRIEL—

**A**MONG the most commonly used steels for motor valves of the various motors are the following:

- 1—Tungsten steels of various formulas, containing from 10 to 18 per cent of tungsten and 0.20 to 0.70 per cent carbon.
- 2—Chromium steels of various grades, containing from 7 to 10 per cent chromium, 0.25 to 1 per cent carbon and variable quantities of silicon, nickel and cobalt.
- 3—Steel with 25 per cent nickel.
- 4—Steels containing from 3 to 5 per cent nickel, with 1.5 per cent chromium and 0.15 to 0.65 per cent carbon.
- 5—Ordinary carbon steel.

In table 1 is given the composition of the various steels corresponding to the above groups and it will be seen that it is not necessary to use such a large variety of steels for valves. Nevertheless, it is desirable to compare all these steels to the ideal steel to see, by comparison, how near they approach the ideal steel and how we can justify their use in valve manufacture.

To learn the values of these different types of metal, numerous tests have been made for each of them and at a higher temperature than that attained by the

Table 1—Steels Used Commonly for Motor Valves

Steel	Carbon	Nickel	Chromium	Tungsten	Cobalt	Vanadium
a	0.65	..	3.5	17.0	..	0.8
b	0.60	..	3.5	14.0	..	0.8
c	0.25	..	3.5	11.5	..	..
d	0.30	25.0	..	..	..	..
e	0.35	..	13.0	..	..	..
f	0.70	..	11.0	..	..	..
g	0.80	..	7.0	..	..	..
h	0.35	3.0	..	..	..	..
j	0.60	3.0	..	..	..	..
k	0.30	3.75	1.0	..	..	..
l	0.30	4.25	1.4	..	..	..
m	0.15	3.75	1.0	..	..	..
n	0.10	5.8	0.25	..	..	..
o	0.30	..	..	..	..	..
p	1.00	0.5	11.5	..	4.0	..

valves during the running of the motor and these results are shown in accompanying tables.

### Tungsten Steels

Tests made to determine the effects of high temperature on various compositions of tungsten and carbon steels listed in table 2, included tensile, ductility and Brinell tests.

All steels have been tested at normal and high temperatures after having been hardened at 950 deg. C. and drawn at 800 deg. C. Results are shown in tables 3 to 6.

### Chromium Steels

Tests were made to find the influence on the physical properties (at normal and high temperatures) of the various combinations of carbon, chromium, cobalt, silicon and nickel listed in table 7. The results of the tests are given in tables 8 to 11.

The heat treatments to which the steels were submitted before testing took place were as follows:

Steels C<sub>1</sub> and C<sub>2</sub>—Air hardened at 880 deg. C and drawn at 700 deg. C

Steel C<sub>3</sub>—Air hardened at 1000 deg. C, drawn at 800 deg. C

\*From *La Technique Automobile et Aérienne*. Translated by G. R. De Nuccio, technical interpreter Standard Steel Car Co. In an article "Steel for Valves of Combustion Motors" in *THE IRON AGE* of Nov. 11, the author discussed valve troubles and the requirements to be met by the ideal valve steel.

Steels C<sub>4</sub> to C<sub>8</sub>—Air hardened at 900 deg. C, drawn at 700 deg. C

Steels C<sub>9</sub> to C<sub>18</sub>—Quenched in oil at 820 deg. C, drawn to 650 deg. C

### Group With 3 Per Cent Nickel

This group is made up of 3 per cent nickel steels with a variable percentage of carbon and chromium, as shown in table 12. A test with a 3 per cent chromium steel is also shown in this group. Results are shown in

### COMPOSITION AND TESTS OF TUNGSTEN STEELS

Table 2—Chemical Composition of the Tungsten Steels

Steel	Carbon	Manganese	Tungsten	Chromium	Vanadium
T <sub>1</sub>	0.60	0.08	17.44	3.64	1.00
T <sub>2</sub>	0.60	0.09	16.37	3.86	0.06
T <sub>3</sub>	0.67	0.09	13.56	3.70	0.10
T <sub>4</sub>	0.45	0.07	13.08	3.62	..
T <sub>5</sub>	0.45	0.08	15.73	3.75	..
T <sub>6</sub>	0.47	0.07	12.68	3.62	0.80
T <sub>7</sub>	0.71	0.05	17.30	3.86	0.75
T <sub>8</sub>	0.43	0.37	12.10	3.19	..

Table 3—Tensile Tests at Ordinary Temperatures

Steel	Elastic Limit Lb. per Sq. In.	Ultimate Strength Lb. per Sq. In.	Elong. Per Cent	Reduction of Area
T <sub>1</sub>	89,500	108,200	18	30.8
T <sub>2</sub>	93,800	116,800	18	24.6
T <sub>3</sub>	93,100	114,000	24	38.6
T <sub>4</sub>	88,200	106,800	25	45.3
T <sub>5</sub>	88,200	99,500	30	59.3
T <sub>6</sub>	89,500	101,000	29	49.4
T <sub>7</sub>	89,500	108,200	19	19.0
T <sub>8</sub>	98,100	112,300	26	53.0

Table 4—Ultimate Strength in Lb. Per Sq. In. at High Temperatures

Steel	Temperature in Deg. C				
	650	700	750	800	860
T <sub>1</sub>	39,800	38,400	35,600	32,700	34,100
T <sub>2</sub>	39,800	38,400	35,600	32,700	34,100
T <sub>3</sub>	39,800	38,400	35,600	32,700	34,100
T <sub>4</sub>	39,800	38,400	35,600	32,700	34,100
T <sub>5</sub>	39,800	38,400	35,600	32,700	34,100
T <sub>6</sub>	39,800	38,400	35,600	32,700	34,100
T <sub>7</sub>	55,400	28,400	22,800	25,600	20,000
T <sub>8</sub>	55,400	22,800	15,600	21,300	18,500

Table 5—Brinell No. of Test Piece at High Temperatures

Steel	Temperature in Deg. C							
	200	300	400	600	700	750	800	850
T <sub>1</sub>	193	228	170	149	131	129	119	101
T <sub>2</sub>	193	228	217	205	193	161	124	114
T <sub>3</sub>	219	166	162	153	143	118	109	95
T <sub>4</sub>	207	164	129	123	115	109	98	92
T <sub>5</sub>	200	149	121	110	197	111	107	98
T <sub>6</sub>	209	156	128	113	111	107	98	98

Table 6—Brittleness at High Temperatures in Foot-Pounds

Temperature of test piece in deg. C	T <sub>1</sub>	T <sub>2</sub>	T <sub>3</sub>	T <sub>4</sub>	T <sub>5</sub>	T <sub>6</sub>
18	6.6	6.4	8.4	22.7	10.3	18.4
100	14.1	10.1	14.5	53.5	31.1	36.2
200	26.0	17.3	21.3	58.5	57.9	39.8
300	21.7	23.2	20.3	65.8	65.0	42.0
400	23.2	21.0	22.2	63.0	67.2	51.4
500	21.7	28.2	21.3	59.3	57.8	37.6
600	22.3	22.4	24.6	64.4	54.2	45.5
700	19.6	23.9	23.9	63.6	57.8	54.2
800	26.2	21.0	30.4	115.4	66.5	62.1
900	28.4	43.4	54.3	114.2	68.7	65.1
1000	39.2	56.4	63.6	122.2	58.6	68.7

table 13. The steels were annealed at 850 deg. C. before the tests.

The heat treatment of these steels before the tests were made follow:

- 1—Quenched in oil at 820 deg. C and drawn at 630 deg. C
- 2a—Air hardened at 820 deg. C and drawn at 600 deg. C
- 2b—Air hardened at 820 deg. C and not drawn
- 3—Air hardened at 820 deg. C and drawn at 500 deg. C
- 4—Rough forging
- 5—Quenched in oil at 830 deg. C and drawn at 600 deg. C
- 6—Quenched in oil at 830 deg. C and drawn at 600 deg. C
- 7—Quenched in oil at 830 deg. C and drawn at 600 deg. C
- 8—Quenched in oil at 830 deg. C and drawn at 600 deg. C

The results obtained from the tests on scaling are



shown by the curves in an accompanying diagram.

### Conclusions Based on Experience

From the tests the following conclusions can be drawn:

1—Steels of similar types have similar properties. By this it must be understood that steels with tungsten have about the same properties while steels with chro-

### COMPOSITION AND TESTS OF CHROMIUM STEELS

Table 7—Chemical Composition of the Chromium Steels

Steel	Carbon	Silicon	Nickel	Chromium	Cobalt
C <sub>1</sub>	0.37	0.25	0.15	12.37	...
C <sub>2</sub>	1.04	0.15	...	10.42	...
C <sub>3</sub>	1.12	0.85	0.50	11.35	3.90
C <sub>4</sub>	0.96	0.17	0.45	13.10	...
C <sub>5</sub>	1.08	0.17	0.50	13.10	...
C <sub>6</sub>	1.18	0.10	0.45	13.10	...
C <sub>7</sub>	1.42	0.35	0.44	13.10	...
C <sub>8</sub>	0.36	0.16	0.23	11.20	...
C <sub>9</sub>	0.54	0.14	0.45	6.30	...
C <sub>10</sub>	0.55	0.75	0.50	7.10	...
C <sub>11</sub>	0.50	0.17	3.08	6.60	...
C <sub>12</sub>	1.09	0.19	0.42	6.30	...
C <sub>13</sub>	1.08	0.56	0.51	6.70	...
C <sub>14</sub>	1.11	0.19	2.96	5.80	...

Table 8—Tensile Tests at Ordinary Temperatures

Steel	Elastic limit, Lb. per Sq. In.	Ultimate strength, Lb. per Sq. In.	Elong., Per Cent	Reduction of Area
C <sub>1</sub>	49,800	96,800	30.0	63.0
C <sub>2</sub>	84,000	148,000	15.0	32.0
C <sub>3</sub>	78,300	121,000	32.0	32.0
C <sub>4</sub>	79,700	121,000	18.5	36.4
C <sub>5</sub>	85,400	125,100	17.5	29.1
C <sub>6</sub>	91,000	129,200	15.5	30.6
C <sub>7</sub>	91,000	134,000	10.0	18.3
C <sub>8</sub>	71,100	96,800	21.0	48.0
C <sub>9</sub>	134,000	145,000	15.7	54.6
C <sub>10</sub>	129,200	148,000	18.6	55.0
C <sub>11</sub>	129,200	151,000	17.2	53.9
C <sub>12</sub>	162,300	175,000	11.4	28.5
C <sub>13</sub>	156,600	176,500	10.0	22.5
C <sub>14</sub>	126,500	142,800	14.3	56.5

Table 9—Ultimate Strength Lb. Per Sq. In. at High Temperatures

Steel	Temperature of Test Piece in Deg. C						
	650	750	800	850	900	950	1,000
C <sub>1</sub>	29,500	...	15,700	15,700	18,500	15,700	11,400
C <sub>2</sub>	48,400	...	22,800	17,100	21,400	17,100	...
C <sub>3</sub>	47,000	...	24,200	16,400	21,400	18,500	...
C <sub>4</sub>	...	31,300	...	15,700	...	...	9,300
C <sub>5</sub>	...	34,200	...	18,500	...	...	8,600
C <sub>6</sub>	...	30,600	...	17,800	...	...	8,600
C <sub>7</sub>	...	30,600	...	17,800	...	...	8,600
C <sub>8</sub>	...	27,100	...	14,200	...	...	8,600
C <sub>9</sub>	...	38,400	...	...	...	...	...
C <sub>10</sub>	...	33,500	...	...	...	...	...
C <sub>11</sub>	...	40,000	...	...	...	...	...
C <sub>12</sub>	...	41,300	...	...	...	...	...
C <sub>13</sub>	...	47,000	...	...	...	...	...
C <sub>14</sub>	...	40,000	...	...	...	...	...

Table 10—Brittleness at High Temperatures in Foot-Pounds

Temperature of test piece in deg. C	Steel				
	C <sub>4</sub>	C <sub>5</sub>	C <sub>6</sub>	C <sub>7</sub>	C <sub>8</sub>
18	9.2	8.1	7.1	5.1	49.2
100	17.4	10.3	12.5	6.3	50.0
200	25.4	19.9	16.1	9.7	50.0
300	23.4	17.7	17.7	10.8	54.2
400	24.7	22.0	14.6	10.8	61.0
500	26.2	20.3	14.9	13.5	53.5
600	29.4	24.1	15.5	11.4	50.0
700	29.0	20.6	18.0	13.5	47.5
750	29.0	23.1	16.4	15.0	52.6
800	38.7	25.0	25.1	18.9	62.8
850	42.9	29.0	38.8	22.4	65.9
900	53.0	38.0	36.4	30.2	101.1
1000	64.1	49.0	44.0	40.7	103.0

Table 11—Tensile Test for Steel C<sub>8</sub> at Various Temperatures

Temperature of test piece in deg. C	Elastic limit, Lb. per Sq. In.	Ultimate strength, Lb. per Sq. In.	Elong. Per Cent	Reduction of Area
18	86,800	108,200	27.5	59.3
100	82,500	97,500	21.0	54.6
200	82,500	98,100	21.0	55.8
300	74,000	88,200	18.5	57.0
400	74,000	89,500	17.5	53.6
450	69,700	78,300	18.5	63.7
500	64,000	65,500	22.0	71.7
600	47,000	54,000	25.0	75.9
700	24,200	27,000	40.0	90.9
800	11,400	15,000	40.5	91.9
850	10,700	15,000	40.5	92.4
900	8,500	10,700	41.0	65.8
970	4,300	4,300	31.5	52.2

mium have also among themselves almost similar properties but these are different from the properties of the steels containing tungsten; likewise, chromium-nickel steels have characteristic properties of their

### COMPOSITION AND TESTS OF NICKEL STEELS

Table 12—Chemical Composition of the Nickel Steels

Steel	Carbon	Manganese	Nickel	Chromium	Vanadium
N <sub>1</sub>	0.28	0.46	2.80	1.39	...
N <sub>2</sub>	0.29	0.46	3.90	1.14	...
N <sub>3</sub>	0.37	0.44	2.76	0.64	...
N <sub>4</sub>	0.24	0.34	4.47	1.02	...
N <sub>5</sub>	0.29	0.43	3.22	0.08	...
N <sub>6</sub>	0.60	0.95	1.99	0.35	...
N <sub>7</sub>	0.35	0.43	...	2.75	...
N <sub>8</sub>	0.67	0.51	...	3.13	0.30

Table 13—Ultimate Strength at High Temperatures in Lb. Per Sq. In.

Steel	Temperature of Test Pieces in Deg. C						
	650	700	750	800	850	900	950
N <sub>1</sub>	35,600	...	18,500	15,700	12,100	10,000	...
N <sub>2a</sub>	32,000	...	18,500	...	11,400	9,200	7,800
N <sub>2b</sub>	29,700	...	17,800	...	12,100	10,000	7,800
N <sub>3</sub>	33,400	...	20,000	...	11,400	10,000	7,800
N <sub>4</sub>	28,500	...	18,500	...	12,800	10,000	7,100
N <sub>5</sub>	...	21,300	...	...	...	...	...
N <sub>6</sub>	...	26,300	...	...	...	...	...
N <sub>7</sub>	...	18,500	...	...	...	...	...
N <sub>8</sub>	...	25,600	...	...	...	...	...

own but these properties differ from those of other steels.

2—There exists a great similarity between the physical properties at high temperatures of steels having a similar composition. Tungsten steel has in most cases a structure consisting of a solid solution of iron, tungsten, carbon and carbon in the free state. Steels with chromium have not this structure unless the carbon content is more than 0.70 per cent. When this proportion is reached, the steel structure is more or less a solid solution (depending on the heat treatment to which the steel has been submitted) and free carbon.

Table 14—Synopsis Table Showing Results of Ultimate Strength of the Standard Steels at High Temperatures, in Lb. Per Sq. In.

	Temperature of Test Piece in Deg. C				
	700	800	850	900	950
High tungsten, high carbon	39,800	22,800	24,900	20,000	14,900
High tungsten, low carbon	35,000	...	...	14,200	...
Low in tungsten, high C.	35,600	...	...	17,100	...
Low tungsten, low carbon	32,700	15,600	22,000	16,400	...
High chromium, low carbon	27,100	14,900	...	10,700	9,300
High chrome, high carbon	33,500	18,500	22,000	17,100	14,200
Low chrome, low carbon	37,000	...	...	16,400	...
Low chrome, high carbon	41,300	...	...	17,100	...
3% nickel, low carbon	21,300	...	...	8,600	...
3% nickel, high carbon	25,600	...	...	10,000	...
3% chrome, low carbon	18,500	...	...	10,000	...
3% chrome, high carbon	26,400	...	...	10,700	...
Chrome-nickel	22,800	15,600	11,400	10,000	7,800

\*Temperature of the test piece 975 deg. C.

As a consequence, the chromium-carbon steels have properties similar to tungsten steel.

3—Among the various steels belonging to the same type, the variation in composition has a distinct bearing on the mechanical properties at high temperatures. This is especially true for tungsten and chromium steels, in which a variation in the carbon contents has a more marked effect on the tensile strength or on the brittleness. This variation is also noticeable in steels with 3 per cent nickel and 3 per cent chromium but it is not so pronounced as in steels containing these ele-

Table 15—General Properties of Various Steels for Valves

Properties	High Wo High C	High Cr. Low C	High Cr. High C	3 per cent Ni	Cr.-Ni.
Breaking load at high temperatures	1	3	2	4	4
Ease of forging	4	3	4	1	2
Ease of heat treating	2	1	2	4	3
Oxidation	3	1	2	4	4
Resistance to change in physical properties	1	2	2	3	4
Self-hardening during use	2	3	4	1	5
Resistance to warping	1	1	1	2	2
Wear between guide and stem	1	3	1	2	2
Hardening of lower end of stem	2	1	1	3	3
Ease of machining	3	1	5	2	4

ments in a larger proportion. In these steels, a variation of 0.20 per cent carbon will have more effect on the tensile strength than a variation of 5 per cent nickel or 7 per cent chromium.

4—Tungsten steel with a high percentage of carbon (for instance, 0.60 per cent) has the highest tensile strength at high temperatures. Steels with the nearest strength are those with a high percentage of chromium and carbon.

5—A steel containing a large percentage of chromium and a small percentage of carbon, stainless steel (acier tache) has a lower tensile strength than a steel rich in tungsten or a steel containing a similar proportion of chromium and much carbon.

6—The nickel or nickel-chromium steels have a very low tensile strength at high temperatures compared with other steels. Variation in the composition of these steels is comparatively of small importance.

7—The influence of vanadium on the properties of steel at high temperatures seems to be negligible.

8—Steels containing cobalt seem not to possess any properties of more importance than the steels without cobalt.

9—Steels rich in chromium present, among all the steels, the greatest resistance to oxidizing at high temperatures. Those of the stainless type possess a very great resistance, those with 7 per cent chromium have an appreciable resistance, but not as good as the ones of the stainless type. But in the last case the products of oxidation are more adherent than in the stainless type.

10—Nickel-chrome steels oxidize easier than steels of any other kind.

11—Tungsten steel oxidizes but little at temperatures below 850 deg. but considerably at higher temperatures.

12—The resiliency of the various steels at high temperatures varies considerably while retaining a relation to the tensile strength about inversely proportional to this latter. Ductility tests show the effects of varying the carbon contents as well as tensile tests, steels containing a high percentage of carbon having a lower resiliency than those with less carbon. In all cases, the resiliency is much greater when steels have a high temperature.

#### Properties of Steels Now Used

It is now possible to examine the various types of steel in order to see how near they come to the qualities of the ideal steel, as previously stated. Each of the 12 properties may be taken separately and each steel examined by itself from the point of view of each of these properties.

For this purpose the author will not take into account steels with different composition but the typical ones in each group, thus the following classification is obtained:

a—Tungsten steel containing not less than 14 per cent tungsten and about 0.60 per cent carbon.

b—Chromium steel containing about 13 per cent chromium and 0.35 per cent carbon.

c—Steels containing 7 per cent to 12 per cent chromium and about 0.60 per cent carbon.

d—Steels containing about 3 per cent nickel.

e—Common nickel-chromium steels.

1—In regard to the tensile strength at high temperatures, steels may be placed in the following order:

High tungsten (class a)

High chromium, high carbon (class c)

High chromium, low carbon (class b)

3 per cent nickel and nickel-chromium

2—If the resiliencies at high temperatures are considered, they will offer nothing of particular interest. As previously stated above, they seem to be the expression

of the tensile strength, excepting that, with an increase in temperature, the resiliency increases faster than the tensile strength decreases.

3—The order in which steels should be placed from the point of view of forgeability is almost exactly the inverse of the one formed in regard to the tensile strength. The 3 per cent nickel steel probably forges the easiest, the nickel chromium follows, while the steels rich in chromium and tungsten are somewhat harder to forge.

4—The ease of forging free from cracks due to the hardening, places the steels in the same order as in paragraph 3.

5—If the facility of heat treatment is taken into consideration, the steels rich in chromium come first, although the steels high in tungsten are treated with equal ease. Chromium steels harden in the air, therefore, they must be treated simply by heating at 900 deg. C. and then cooling in the air, after which they can be drawn at a temperature of 750 deg. C. Tungsten steels are completely drawn at a temperature of about 800 deg. C. and this operation is further facilitated if the steel is heated first at 950 deg. C. and then let cool in the air. Nickel steels and most of the nickel-chromium steels are hardened in the oil at about 830 deg. C. and drawn at 600 deg. C. A few nickel-chromium steels are hardened in the air at 800 deg. C. and drawn at 660 deg. C. But as explained further on, steels that can be treated in this way are not to be recommended.

6—In regard to scaling, the advantage rests by far with the chromium steels. Steels rich in chromium with small quantities of carbon are those which are least subject to scaling (class b) and those containing a medium percentage of carbon will oxidize still less; besides, these latter have the advantage that their products of oxidization are more adherent. Tungsten steels scale much more than chrome steels, but not as much as nickel or chrome-nickel steels.

7—In regard to maintaining the physical properties, this depends solely upon the temperature used in heating the metal during the time work is performed on it. *It must be taken as an axiom in regard to the use of steels for valves that the temperature to which the steel will be submitted during the running of the motor shall not be more than the one used in drawing.* If this rule is observed as far as possible (although this cannot be done in case of valves working at more than 800 deg. C) tungsten steels may be considered as having excellent qualities from this point of view. Chromium steels are almost as good but the chrome-nickel steels are subjected to some change in properties, especially so in regard to resiliency. Nickel steels hold their physical properties very well, if the above-mentioned rule is fully respected.

8—Steel shall not harden when cooling in the air from the temperature obtained while running in the motor and this strictly limits the application of the various steels.

Tungsten steels harden a little starting from 850 deg. C., more when heated at 900 deg. C., but not as much as if it would be brought to very high temperatures.

Chrome steels completely harden when heated at 900 deg. C. and cooled. They harden also at 850 deg. C., the critical temperature being 800 deg. C.

Nickel steel does not harden, but, on the contrary, becomes softer when brought above the hardening temperature (about 720 deg. C.). Certain chrome-nickel steels harden in air and the temperature of this hardening is not very high, usually 750 deg. C., but not all chrome-nickel steels harden in the air.

9—Steels are more free from warping if hardened in air than if hardened in oil. The choice in regard to this property is quite small among the various steels.

10—The excess play between the stem and the guide is a trouble taking place but rarely with tungsten steels, because even after having been drawn at 800 deg. C. they have a tensile strength of 121,000 lb. per sq. in. Further, chrome steels (class b) have often given a considerable amount of trouble, because, when properly treated, they have a tensile strength of about 90,000 lb. per sq. in. and are easily worn out. The wearing resistance of nickel or chrome-nickel steels depends upon the heat treatment to which they have been subjected. Therefore it will be seen that for this quality the tungsten steels are the best.

11—Now, if we consider the hardening of the lower end of the stem, it will be noticed that tungsten steels are used but it is very doubtful if they are the most suitable for this treatment. Really, in order to harden these steels effectively, it is necessary to bring them to a very high temperature, a thing which makes the hardening operation still more difficult. Chrome-steels harden easier, but it must be remembered that chrome-nickel steels hardened in the air cannot be utilized on account of their tendency to become hardened during the running of the motor. The valve stems made of steel with a high chromium content may be hardened in air at 860 deg. C. (lower than tungsten steels.) Nickel steels cannot be satisfactorily treated by this method as they must be quenched in a liquid, not a very desirable thing.

12—The ease of machining is a very important factor in the choice of valve steel. From this point of view, steels rich in chromium and with little carbon (class b) are by far the easiest to machine, nickel steel coming next.

Tungsten steels are not troublesome if properly treated, and the same applies to steels rich in chromium and rich in carbon. Nevertheless, with these latter steels, unless the carbon is below 0.70 per cent a great number of rejections are to be expected. Nickel-chromium steel can be satisfactorily machined only when correctly treated.

Table 15 shows the above data. The steel possessing in the highest degree the desired properties is marked 1 and the one in the lowest is marked 5.

Recapitulating the results mentioned above, it is possible to advise the engineer designing the motor which is the best steel for the valves of his motor, under whatever conditions they may have to perform their work. As already stated, it is not at all necessary to study the physical properties of all the steels listed above; the author considers the following selection as practically the best:

- 1—A tungsten steel
- 2—A steel high in chromium
- 3—A nickel steel

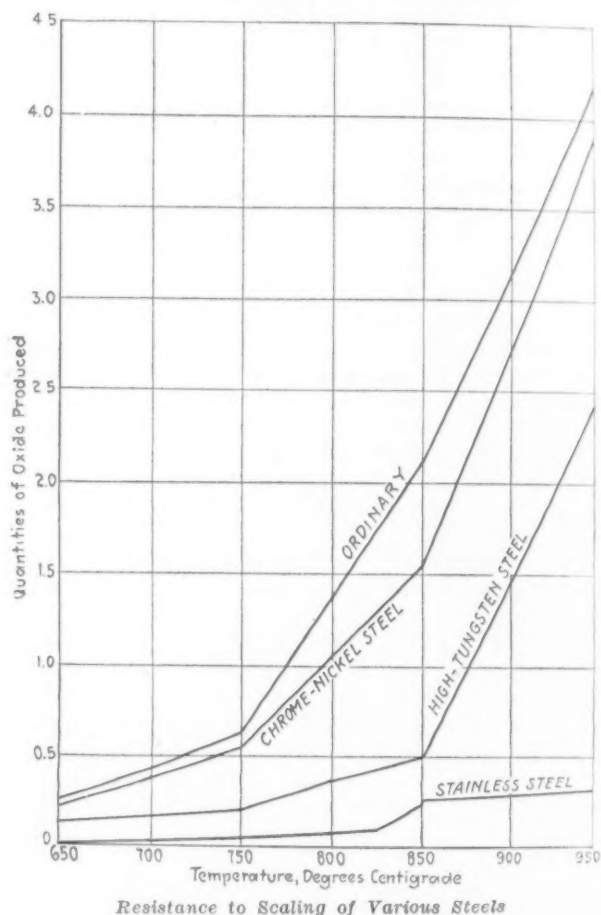
This list does not contain nickel chromium steel and this can be justified by several reasons: the chrome-nickel steels do not possess, at high temperatures, physical properties better than those of plain nickel steel, and they are also harder to work without producing cracks and to forge free of defects. Many of the chrome-nickel steels become hardened in air and therefore they are apt to become hardened during the running of the motor and break. For all the above reasons it is useless to use a nickel-chromium steel when a plain nickel steel may fulfill the same purposes and may be better.

The nickel steel is on the list on account of its numerous advantages and because it is desirable to use, in many cases, a good quality of steel at a cheap price. The price of the nickel steel is almost one-fourth of that of the chromium steel and one-eighth that of the tungsten steel. As nickel steel has quite a relatively low strength at high temperatures, it should be used only for valves of motors running at relatively low temperatures. The limit of temperature at which a steel can

be used is the one used in drawing during the heat treating process. This is seldom above 650 deg. C., therefore the steel should work below this limit. By carefully selecting the steels which have been examined, the following compositions seem to be the most satisfactory, all factors taken into account:

	Per Cent
Carbon .....	0.30 to 0.35
Nickel .....	2.75 to 3.75
Manganese .....	0.40 to 0.70

These steels can be conveniently treated by quenching in oil after being brought to 830 deg. C. and drawn



at 625 deg. C. and their physical properties are about as follows:

Tensile strength, 57,000 lb. per sq. in.	
Elongation, per cent.....	20
Reduction of area, per cent.....	45
Brinell hardness No.....	220

A steel such as the above can be successfully used for exhaust valves of rotating motors for aviation and motors for automobiles.

In regard to steel with a high percentage of chromium, its main advantages are the following:

- 1—Great resistance to scaling, this property being more or less common to all chrome steels containing more than 6 per cent chromium.
- 2—It may be easier to heat treat on account of its property of hardening in air.
- 3—It is low in carbon and the physical properties of this steel are for ease of machining.

But this steel has many defects:

- 1—It cannot be easily obtained free of cracks.
- 2—It is not easily forged.
- 3—The type low in carbon (the one easier to work on at ordinary temperatures), is not very resistant at high temperatures, but this resistance is increased by increasing the carbon contents, then the steel becomes too hard to be easily worked. A compromise between these two points is evidently to be sought.

The following may be considered the most suitable



composition for valves made of chrome steel:

	Per Cent
Carbon .....	0.65
Silicon .....	0.60
Manganese .....	0.50
Chrome .....	10.00

This steel must be air hardened at 900 deg. C. and drawn at 750 deg. C. When cold it possesses the following properties:

Tensile strength, 121,000 lb. per sq. in.	
Elongation, per cent.....	18
Reduction of area, per cent.....	35
Brinell hardness No.....	248

Taking into account the above list, the following steels may be best used as follows:

- All intake valves....3 per cent nickel steel
- Exhaust valves working at a temperature of not more than 600 deg. C....3 per cent nickel steel.
- Exhaust valves working at a temperature between 600 deg. C and 700 deg. C....high chromium.
- Exhaust valves working at a temperature of more than 700 deg. C....high tungsten steel.

### New England Shipyard Affairs

Following a petition in equity, filed by the Crandall Engineering Co., Boston, asking that a receiver be appointed for the Winnisimmet Shipyards Co., Inc., Chelsea, Mass., the court appointed William R. Green and Edmund K. Arnold temporary receivers, in bonds of \$25,000 each. The petition of the engineering company states the Winnisimmet company is indebted to it for labor and materials, and the petitioner believes is indebted to other persons and corporations to the extent of approximately \$750,000. The Winnisimmet company employs about 400 men.

The Fore River Works, Quincy, Mass., Bethlehem Shipbuilding Corp., Ltd., has overcome its labor troubles and is preparing to embark on an extensive construction program to extend over a period of three or four years. The management announces that the keel of the superdreadnought Massachusetts will be laid soon after New Year's Day. The Massachusetts will be larger than any vessel now in the United States Navy. She will have a length of 660 ft. overall and 106 ft. beam, while her displacement will be 43,200 tons.

The keel of the Lexington, a battle cruiser, will be laid soon after that of the Massachusetts. She will have almost exactly the same beam as the Massachusetts, but her length overall is to be 880 ft. and her displacement 43,500 tons. Her engines of 180,000 hp. will yield a speed of 35 knots under electric drive.

Two unnamed scout cruisers, with 90,000 hp. engines and a speed of 35 knots, also will be built at Fore River plant the coming year.

The Fore River plant is working on naval construction that will total approximately \$75,000,000.

The Texas Co. and the Bath Iron Works, Bath, Me., have sufficient work on hand to keep them operating at the present rate well into 1921. At the Government Navy Yard along the New England Coast shipbuilding activities are confined largely to repair work, and none of them is rushed. Work at Sound points, generally speaking, is quiet, and indications are it will remain so for several months. One Rhode Island shipyard is being dismantled and moved to New York.

### Clip Sheet of Inter-racial Council

A clip sheet service for business and financial publications and chamber of commerce and industrial association bulletins has been started by the Inter-racial Council, 233 Broadway, New York, under the description of the *Inter-racial Council Chronicle*. Volume 1 and Number 1 issue appears with the date of November, 1920. In the words of the president of the council, William H. Barr, "The *Inter-racial Council Chronicle* is designed to make public the information collected by our research department from the foreign language press and other sources not generally available. The cartoons are designed to impress upon business men the necessity of considering immigration, our greatest labor

supply, as carefully as they consider production and market problems."

The 15 pages of reading matter in this first monthly contain the following topics: Government figures indicate loss of alien laborers, checks on immigration, outgoing labor, incoming labor, assimilation measures, labor conditions abroad and books and articles on immigration. The book is of attractive make-up, the title of each division appearing on the margin.

### Plenty of Ore in the Valleys

YOUNGSTOWN, OHIO, Nov. 30.—With but 29 of the 46 blast furnaces in the Mahoning and Shenango Valleys active, operators entertain no fears that there will be an ore shortage this winter. On the other hand, interests anticipate the possibility of being overstocked, in view of the improved movement from lake docks to interior furnaces during the latter half of the lake navigation season. With navigation practically closed, 13,000,000 tons of ore has come to the Valleys this season, which is 2,500,000 tons more than last year and 1,500,000 tons less than in 1918.

Nominal requirements of the 46 furnaces in the Valleys when operating normally are placed at 14,000,000 tons annually, of which the 25 stacks in the Mahoning Valley require 8,500,000 tons and the 21 in the Shenango Valley 5,500,000 tons. Ore consumption of the major interests in the Mahoning Valley is placed at 2,000,000 tons for the Youngstown Sheet & Tube Co.; 2,000,000 tons for Republic Iron & Steel Co.; 1,200,000 tons for Brier Hill Steel Co.; 2,000,000 tons for Ohio Works, Carnegie Steel Co., and 800,000 tons for Struthers Furnace Co., A. M. Byers Co. and Sharon Steel Hoop Co. combined.

Ore docks at Ashtabula are well stocked, the New York Central having some 2,350,000 tons on its docks and the Pennsylvania as much.

### Tariff Commission Report

WASHINGTON, Nov. 30.—The United States Tariff Commission has published a bulky volume dealing with developments since the war in the production of anti-mony, chromite, graphite, magnesite, manganese, potash, pyrites, sulphur, quicksilver and tungsten. The document is intended to form the basis of information at next spring's revision of the tariff. There is no likelihood that any action will be taken during the winter session of Congress. The document contains elaborate detail of domestic and foreign production, uses, sources of supply, exports, imports, markets, prices, competitive conditions and tariff history of each of these minerals. Copies of the report may be obtained from the Superintendent of Documents, Washington, for 65c.

### Expansion of A. M. Castle & Co.

A. M. Castle & Co., iron and steel jobbers, Chicago, have purchased dock property abutting the turning basin in the north branch of the Chicago River, comprising 138,131 sq. ft., and an adjoining tract, 72,488 sq. ft. in area. The two tracts are adjacent to property previously bought from Cyrus H. McCormick. The purchases give the Castle company 12 acres with over a quarter mile of river frontage within two miles of the "loop." The present warehouses of the company cover two and one-half acres and buildings recently acquired from Mr. McCormick contain three acres of floor space. A new unit to be built in the spring will cover 150,000 sq. ft. and will cost \$450,000.

### No Merger of Foundry Equipment Companies

Plans of the American Foundry Equipment Co., New York, to merge with the Whiting Foundry Equipment Co., Harvey, Ill., have been abandoned. It had been proposed to call the merged companies the Whiting Corporation, to be capitalized at \$5,000,000.

The Carnforth Hematite Iron Co., Carnforth, England, has placed a contract with Freyn, Brassert & Co., Chicago, for the installation of gas cleaning units at its blast furnaces.

## Pipe Cast Centrifugally

"Modern Cast Iron Pipe" was the title of a paper read recently before the Engineering Institute of Canada, Montreal Branch, by A. F. Macallum, commissioner of works, Ottawa. His remarks regarding the De Lavaud process of making centrifugally cast iron pipe were in part as follows:

"The present specifications for cast iron pipe are based on iron having a tensile strength of 19,000 lb. per sq. in. When higher standards are given under the present foundry practice and mixtures, the pipe is apt to be brittle. On account, however, of new methods being adopted in manufacturing cast iron pipe, consideration is being given to the revision of the specifications to meet these new conditions. This new pipe, developed by De Lavaud, a Brazilian engineer, is now being manufactured and introduced in this country, after exhaustive comparative tests with the ordinary standard cast iron pipe.

"The writer has studied with great interest the manufacture of this new type of cast iron pipe, which involves the application of the principle of centrifugal force to molten metal when poured into a permanent mold. A regulated quantity of molten iron is introduced into a revolving water-cooled cylindrical mold, whereby the centrifugal force exerted the molten metal is spread uniformly upon the inner surface of the mold. Within a few seconds the pipe is withdrawn from the mold at a red heat. It is brittle after leaving the mold, on account of the outer surface being chilled, but after passing through an annealing furnace it becomes tough and much stronger than ordinary cast iron pipe, as plainly shown by the recent tests made by Professor Gillespie of Toronto University. The pipe made under these conditions has a decided contrast in structure to pipe cast in sand molds, and has not the segregation of impurities often found in sand cast pipe. As a consequence the pipe is a homogenous, dense, fine-grained iron throughout, having no water or gas bubbles, and because of this density and strength can be made much thinner.

"In the tests made by Professor Gillespie a 6-in. pipe made by this machine was compared with a 6-in. ordinary sand molded pipe and out of the same iron with the following results:

Centrifugal Cast Pipe	Sand Cast Pipe
Thickness: 0.28 in.	Thickness: 0.51 in.
Tensile strength: 39,000 lb. per sq. in.	Tensile strength: 16,000 lb. per sq. in.
Modulus of elasticity: 14,500,000	Modulus of elasticity: 8,860,000
Modulus of rupture: 63,800	Modulus of rupture: 33,900
Quality factor: 20.2	Quality factor: 9.8

"From this it will be seen that the centrifugal pipe has a very high tensile, cross-bending and resistance to shock values.

"It is apparent, therefore, that this type of pipe can be successfully made much thinner than the sand molded pipe. For example, a 12-ft. length of 6-in. pipe weighs 280 lb., as compared with 430 lb. for a sand cast pipe of the same diameter.

"In soils such as found in Ontario cast iron pipe suffers very little corrosion. The writer has removed a section of old English cast iron pipe laid in 1859 in Hamilton that showed no corrosion whatever, after being in the ground over 50 years, having even the weight marks clearly legible. This old English pipe was made much thinner than called for in the present day specifications and, being on a rising main, is still in service under more severe conditions from pressure than when laid. In this connection the tests on De Lavaud centrifugal cast iron pipe show it, to all intents and purposes, impervious to corrosion, probably due to the fact that the metal, being cast under pressure, is of such close grain as to resist the attack of corrosive matter.

"These centrifugal cast pipes have a smooth exterior and interior surface and, besides reducing hydraulic frictional losses, take a uniform surface coating. While the pipes are cast with standard bell ends they machine easily, and because of the method of manufacture the

wall thickness is exactly uniform throughout and suitable for a threaded or straight wall joint if desired.

"This development in the manufacture of cast iron pipe, which I have attempted to briefly describe above, indicates what might be called a revolutionary advance over previous methods, and is certain to have a decided effect upon the production and consumption of cast iron pipe.

## Decreased Use of Abrasives

WASHINGTON, Nov. 29.—Consumption of artificial abrasives in the United States in 1918 totaled 87,600,000 pounds, worth \$6,940,000, against 115,822,000 pounds, worth \$8,137,242, in 1917, according to figures compiled by the Geological Survey. A "large manufacturer," says the report of the Survey, declined to give his production figures for the second half of 1918, so the figures published are incomplete.

The artificial abrasives considered in the report are of three kinds: (1) Metallic abrasives, manufactured by the Pittsburgh Crushed Steel Co., Pittsburgh, and including "diamond crushed steel" (crushed crucible steel), "angular grit" (crushed chilled iron), and "crushed cast iron"; (2) silicon carbides, including carborundum, manufactured by the Carborundum Co., Niagara Falls, N. Y.; crystolon, manufactured by the Norton Co., Chippewa, Ont., and carbolon, manufactured by the Exolon Co., at Thorold, Ont., and Blasdel, N. Y.; (3) aluminum oxides, including alundum, manufactured by the Norton Co., at Niagara Falls, N. Y., and Chippewa, Ont.; aloxite, manufactured by the Carborundum Co., at Niagara Falls, N. Y., Niagara Falls, Ont., and Shawinigan, Quebec; exolon, manufactured by the Exolon Co., at Blasdel, N. Y., and Thorold, Ont.; lionite, manufactured by the General Abrasives Co. (Inc.), at Niagara Falls, N. Y.; coralex, manufactured by the D. A. Brebner Co. (Ltd.), Hamilton, Ont., and natite, manufactured by the National Abrasive Co., Hamilton, Ont.

Among the natural abrasives large gains were shown in grindstones and pulpstones, millstones and chasers, and garnet, and there were gains also in oilstones and scythestones, pumice and grinding pebbles. These gains were largely attributable to increased prices although there were increases in the quantities also of some of the commodities. There was a decline in the domestic production (quantity and value) of emery and corundum, diatomaceous earth, tripoli and tubemill lining.

The natural abrasives produced and consumed in the United States in 1918 were worth \$2,864,332. Imports of abrasives in the same year totaled \$1,187,632.

## Slushing Oils for Protecting Bright Metals

WASHINGTON, Nov. 30.—Manufacturers of machinery and castings have a particular interest in a report that has been completed by the experts of the Bureau of Standards on "Slushing Oils." It is being issued as Technologic Paper No. 176 and may be obtained by application to the bureau. The authors are P. H. Walker and Lawrence L. Steele.

"Slushing oils," says the official abstract of the paper, "are materials used for protecting bright metal where it is not practical to use paint, varnish, or other fixed coatings. The paper contains a discussion of properties and methods of testing, most of which were developed in the course of this investigation, and summarized results of tests of a number of samples. From a study of numerous laboratory and exposure tests proposed specifications are given. The specifications suggested are based upon properties of the finished product rather than chemical composition. Formulas are given of some satisfactory mixtures, but it is not claimed that these are the best slushing oils that can be made. They are merely cited as examples of easily made preparations which were found to protect metal."

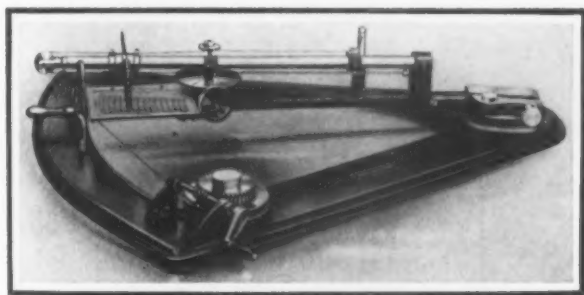
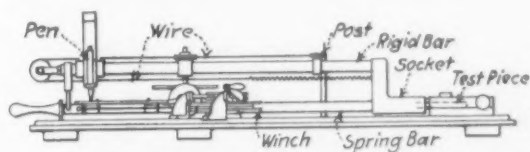
Plans are under way for the construction in South Boston of a one and two-story, 160 x 240 ft. warehouse and office for the Berger Mfg. Co., Canton, O., sheet metal building products.



## Static Notched-Bar Testing Machine

A static notched-bar testing machine for the quantitative measurement of the brittleness and ductility of steel and other metals has been designed and patented by J. C. W. Humfrey and is marketed by Holz & Co., 17 Madison Avenue, New York. The machine yields an autographic record of the bending-angle, bending-moment diagram, and is equipped with an automatic integrator which gives the total energy absorbed in breaking the test piece. It is pointed out that most of the difficulty found in impact tests is due to the fact that in breaking notched bars in a single blow impact machine a single figure only is obtained, representing the energy expended in breaking the test piece plus an unknown and variable amount of energy expended in vibration, friction, etc., and no information is made available as to the values of the various factors of which this figure is the integral. By means of the static test, however, it is explained, it is possible to obtain exact information, at each stage of the test, of the value of two governing factors, i.e., the angle to which the specimen was bent and the resistance offered to the external bending-moment producing the deflection.

The machine operates as follows: The test piece is gripped in the vise so that the jaws are in line with



Steel and Other Metals Are Tested for Brittleness and Ductility on Humfrey Static Notched-Bar Testing Machine. An autographic record of the bending-angle, bending-moment diagram is obtained and an automatic integrator gives the total energy absorbed in breaking the test piece

the notch in the test piece. The socket is attached on the projecting end of the test piece and is a reasonably close fit. A bending stress is applied to the test piece by the winch, and the wire which is attached to the outer end of the spring bar. The inner end of the spring bar is firmly fixed to the socket and the outer end is supported by two rollers. The socket carries also a rigid bar.

The deflection of the spring bar is a measure of the bending-moment applied to the test piece. Since the rigid bar is not subjected to any bending moment it will move through the same angle as the socket, and this movement will, therefore, be a measure of the bending of the test piece. The pen slides upon the rigid bar, its position being determined by the thin wires which are kept taut by a light spring. One end of the wire is attached to a post so that as the rigid bar moves in consequence of the bending of the test piece the wire will draw the pen to the right. The point of the pen marks upon a calibrated chart carried on the spring bar, therefore, if the test piece offered no resistance whatever to bending force the pen would draw a horizontal line on the chart, the length being proportional to the angle through which the test piece was bent. Assuming the test piece was rigid and did not bend at all under the applied force, the pen would draw a vertical line on the chart, the height of this line representing the magnitude of the bending moment applied. Since in actual practice both of these effects are operative at the same time, the result is that the pen draws upon the chart a diagram or "graph" showing the relation between bending moment applied and

angle of bending throughout the duration of the test.

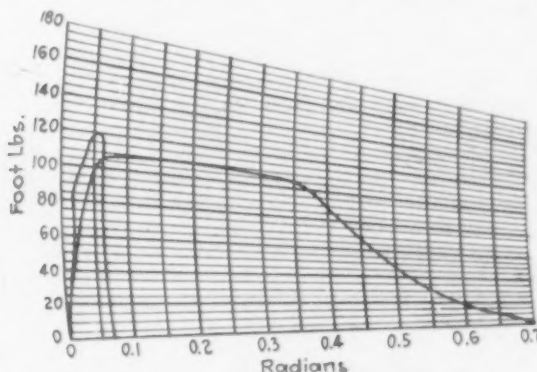
The standard test piece is similar to that used for single impact tests in the Charpy and Izod machines, namely, 10 mm. by 10 mm. section with a round bottom V notch cut at the region intended to be tested. It is convenient to cut several notches in a long specimen so that consecutive tests may be made, thus giving information as to variation in the bar and allowing average results to be calculated for the material under test.

The total energy absorbed in the breaking of the test piece can, of course, be calculated from the diagram or graph. The machine is also fitted with a device, shown in the illustration, which integrates the total energy absorbed in breaking the test piece. This is equipped with an index disk which can be calibrated to read direct in foot-pounds.

The whole machine is mounted upon a metal base and is arranged for convenient and rapid operation by relatively unskilled users.

## Preheating Fuel Oil for Cupolas

The Reilly fuel oil heater for the preheating of fuel oil, and described in THE IRON AGE, issue of Dec. 25, 1919, with particular application to oil fired boilers in power plants, is now being applied to preheating fuel oil for cupolas. According to the manufacturer, the Griscom Russell Co., 90 West Street, New York, the oil is pumped through coils of seamless drawn steel tubing which constitute the heating surface. High pressure steam is generally used for heating and the condensa-



Autographic Diagrams Obtained on Humfrey Static Notched-Bar Testing Machine. The short curve was obtained from metal rigid and brittle; the longer curve, from a tough and ductile test piece

tion is returned to the boilers. It is, therefore, important that precautions be taken to prevent contamination of this high pressure condensate by the fuel oil. This is taken care of in the Reilly heater by patented oil heater connections which are so designed that no oil joints are inside the steam space.

## Slight Gain in Shipbuilding

American shipyards were building or under contract to build for private shipowners on Nov. 1 334 steel vessels of 1,206,486 gross tons, compared with 330 vessels of 1,236,327 gross tons on Oct. 1. These figures, which are those of the Bureau of Navigation of the Department of Commerce, do not include Government ships or ships building or contracted for by the Shipping Board.

Ten large buildings and 12 standing ways of the Seattle-North Pacific Shipbuilding Co., Seattle, Wash., are being razed, the concern having gone out of business. The Ames Shipbuilding & Drydock Co., Seattle, is now receiving bids for the purchase of all remaining buildings, machinery, equipment and improvements located at its shipyard plant in Seattle. This concern has also retired from the shipbuilding industry.

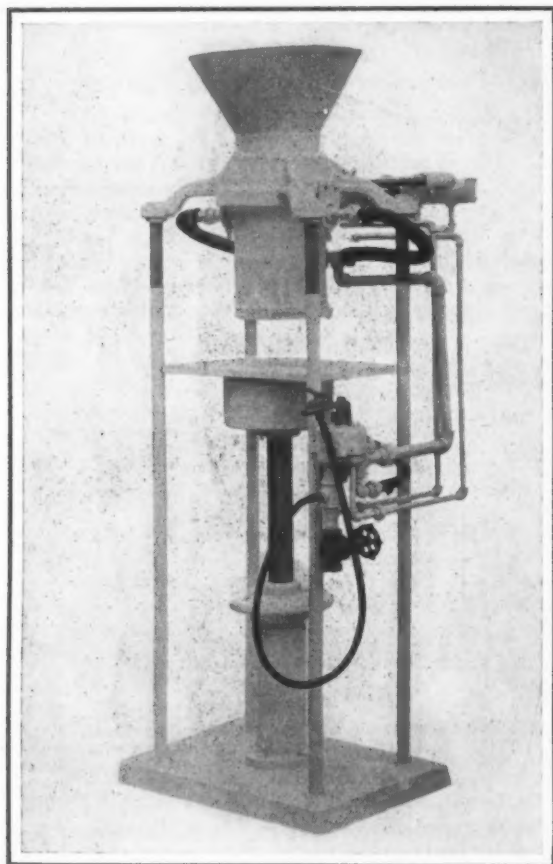
The Franklin Automobile Co., Syracuse, N. Y., announces the inauguration of a new department known as the commercial research department. E. J. Buchaca is in charge, with W. L. Wales as his assistant. A staff of clerks completes the personnel.



### Compressed Air Core Machine

The foundry engineers of the E. J. Woodison Co., Detroit, have designed a new core machine operated by compressed air. The manufacturer advises that an output up to 180 cores an hour is being produced by the machine.

The operator places the core box on the machine, turns a handle a quarter turn, and the core is completed. The cores made, it is explained, are of a uniform density and have a natural venting because the air is forced through the core carrying the fine sand to the outside giving a smooth surface and allowing all gas to pass off freely. The machine is practical for two part or split core boxes that ordinarily have to be made in half, and either pasted together, or the box closed while green. When this is done, sand gets in the joint and results in a core that is larger than the



An Output of 180 Cores Per Hour Is Given as the Production for New Woodison Compressed Air Core Machine

actual core box. With this core machine, it is pointed out, this is not possible, because the box is closed and the sand is forced into the end, thus giving a core of actual size.

The Air Reduction Sales Co., 120 Broadway, New York, now has ready for distribution a booklet entitled "Cutting Cast Iron with the Oxyacetylene Torch." It is attractively illustrated and is a reprint of a paper on the subject prepared by A. S. Kinsey, professor of shop practice, Stevens Institute of Technology, for the recent meeting of the American Foundrymen's Association. It covers the subject of cutting cast iron by the oxyacetylene flame, tells how the cut is made, gives necessary pressures of oxygen and acetylene for varying thicknesses of metal, describes the advantages to be obtained from the use of the torch for cast iron, the economy as compared with other methods of cutting, etc.

The Ashland Iron & Mining Co., Ashland, Ky., has increased its capitalization from \$1,800,000 to \$5,000,000. The company operates blast furnaces, steel and sheet mills at Ashland, Ky. No announcement has been made by the officials as to whether the company's operations will be extended.

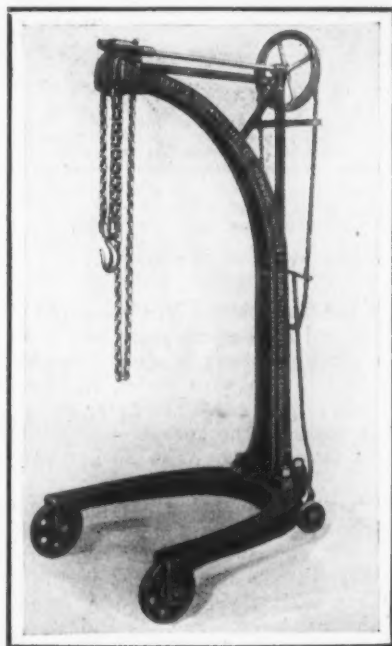
### October Employment Statistics

Statistics of employment in industry for October, as compiled by the Bureau of Labor Statistics, Department of Labor, Washington, show that in 105 iron and steel plants 182,910 was the number on the payroll in October, a decrease of less than one-tenth of one per cent from the number employed in September, and the October semi-monthly payroll amounted to \$14,682,365, an increase of 3.5 per cent over the payroll of September. These figures indicate roughly that individual wage in October was 3.5 per cent more than in September. Similar figures for 108 iron and steel plants indicate that the average wage is 17.8 per cent more than in October, 1919. The present average semi-monthly wage appears to be \$80 in the iron and steel plants.

In 47 automobile plants 118,970 were employed in October, a decrease of 12.4 per cent from September, and the weekly payroll amounted to \$4,447,376, a decrease of 5.2 per cent, thus showing a per capita increase in wages in the month of 8.2 per cent. The average weekly wage figures at about \$37. Compared with October, 1919, the average weekly wage was 13.6 per cent higher this year. In 40 car building and repair plants, the employment in October was 47,498, a decrease of 1.7 per cent, and the semi-monthly payroll was \$3,666,515, an increase of 3.4 per cent. In this case the car builders' wages were apparently 5.2 per cent above those of September, but 116 per cent above those of October, 1919. The average semi-monthly wage appears to be \$77.

### Portable Floor Cranes

A portable floor crane of all steel construction and equipped with a worm and gear type hoist has been developed by the Barrett-Cravens Co., 169 North Ann Street, Chicago. Features emphasized for the worm



A Worm and Gear Type Hoist Is Provided on This Portable Floor Crane

and gear hoist are that the load can be raised to any height desired even to 0.001 in., and the load is automatically locked at all points of travel, thus to insure safety.

The worm gear is bronze and the screw is cut from solid steel shafting, all inclosed in an oil tight housing to permit of proper lubrication. All wheels are equipped with Hyatt roller bearings. The chain is electric welded.

Theodore L. Dodd & Co., Chicago, have been appointed Western sales representatives for the Allegheny Steel & Tube Co., New York, with warehouse at Rochester, Pa.

## PRICE REDUCTIONS

### Probable Effect on Wages in the Valleys—Significant Contracts for Sheet Bars

YOUNGSTOWN, OHIO, Nov. 30.—Price declines in the iron and steel market were accelerated last week by announcement by important independent Valley interests of reductions in bars and plates to 2.35c. for bars and 2.65c. for plates to conform to Steel Corporation quotations. Wire and cold-rolled products are to be revised downward. For some weeks there has been a steady downward trend in prices of sheets and black is quotable, base, from 4.85c. to 6.50c., in comparison with the Steel Corporation price of 4.35c. Strip steel, wire products and tin plate have been steadily declining. In the Valleys, especially, it is the impression that wage reductions for employees in many departments will follow the enforced price cuts. The president of the leading interest states that while "there is no thought at this time of any general reduction in wages, wage rates of certain employees who are paid more than similar employees of the Steel Corporation will be reduced to the level of wages of that concern."

District independents immediately followed the lead of the Jones & Laughlin Steel Co. in its price reduction program.

When skilled workers were scarce during the war, plate mills were manned by the payment of premium wage rates, which will now be eliminated owing to the necessity of closer competition. Other small groups of workmen will be affected, among them employees of open-hearth departments. Officials of one company are already arranging readjustments which will likely become operative Dec. 1.

While some interests are inclined to interpret the developments in prices during the past week as merely a part of the progressive decline which has been a feature of the market for the past month, others believe they presage more important developments, both with respect to prices and wages.

#### Price Readjustment Necessary

For a time some manufacturers contended that it would be impossible to reduce prices in face of sustained high production costs. Confronted by a slump in buying and keener competition, these interests were compelled to adjust prices on a buyer's level and fix costs proportionately. As other commodities decline, it is emphasized that makers must adjust prices to conform to competitive conditions, and it is believed other finished products will be substantially affected. Readjustment in the price fabric is certain, sooner or later, to produce somewhat proportionate readjustments in costs. The principal item in costs is labor and it is inevitable, therefore, that wages will be affected.

Valley producers, for the most part, have been on an unfair competitive basis during the past two months, they maintain, with Pittsburgh independents, by reason of the difference in coal costs in the two districts. In some instances, it is pointed out, fuel has cost Valley makers two and three times as much as it has cost independent Pittsburgh producers. While fuel costs have been in a process of readjustment for a month or more, freight costs are stationary. The only place left, then, to rearrange costs is with respect to labor.

Because of the preponderance of sheet capacity in the district, in proportion to other finished product capacity, the negotiation of sheet bar contracts at \$47, the Steel Corporation price, by independents for first quarter delivery, is of especial significance, for such contracts preface generally lower quotations for all three grades of sheets. Makers have been contending all along that sharp price concessions could not be made, in view of sheet bar deliveries on contracts made at \$60 and \$65. With substantial cuts in semi-finished material, further readjustments in the prices of sheets are considered a likelihood of the immediate future.

#### Increase of Orders Expected

While the current volume of new business is confined to small tonnages, it is the expectation that orders will be placed in a considerable aggregate as soon as prices

become more stabilized. Galvanized makers have been afforded an advantage by the continued decline in spelter, and while the independent market range is nominally from 7c. to 8c., business could be transacted on a basis under 7c. Spelter is now quotable in the spot market at 5.95c. to 6c., December delivery 6.05c., and first quarter delivery 6.10c.

Furnace coke prices further receded during the week, and this grade of fuel is now obtainable from \$7 to \$7.50, a large consumer states. By-product coal range is from \$4 to \$5, with steam coal still lower.

In face of the recent concession of \$10 a ton on hot and cold rolled strip steel, there is limited demand. Just what effect the reduction in plate prices will have for the time being is a matter of speculation, as buying has been done in very limited amounts for several months. Plate departments of local interests have been more or less inactive, as a consequence. While it is held that there is a heavy potential demand, it is considered unlikely that the new prices will draw forth heavy tonnages for the time being.

One of the influences operating against new business in steel bars and other finished commodities is the tendency of consumers to fill current needs from warehouse stocks even at higher prices, rather than commit themselves for large tonnages with producers. This policy, prolonged, is certain to diminish steel stocks of the country, as production is being maintained only against orders on the books.

#### Pipe Still Active

Pipe continues to be the particular bright spot of the industry in the Mahoning Valley. In view of current demand and expectation of continued requirements from the building trades, jobbers are showing no objection to maintaining butt-weld stocks, while oil country demands are heavy. Until very recently the unfilled pipe tonnage of a leading maker showed no reduction, even against expedited shipments.

Though the leading tin plate interest is well committed, it is doubtful whether forward business booked at this time would command better than \$7. This represents a substantial decline from recent levels.

While the outlook for iron prices is uncertain, there is an expectation that demand for pig iron will show signs of revival before steel. Basic is quotable at \$35, at furnace.

While wire nail and plain wire demand is reduced, makers continue to maintain operations in such departments around normal. Soft wire rods, No. 5, are obtainable at \$70, which is \$15 down from the peak.

Resale ferromanganese may be obtained as low as \$135, with the market in a lethargic state.

Scrap material buying has ebbed to insignificant proportions. Heavy melting steel is nominally quotable at \$22 and hydraulically compressed between \$19 and \$20.

Liquidation is evidently approaching its crest in the Valley, with buyers ruling practically all the markets.

#### Will Hold Triple Convention

A triple convention of the National Supply and Machinery Dealers' Association, the Southern Supply and Machinery Dealers' Association and the American Supply and Machinery Manufacturers' Association will be held at Atlantic City, May 16, 17 and 18, 1921, with headquarters for all three associations to be at the Marlborough-Blenheim Hotel. This is the first time that the three organizations have participated in a joint convention since the Pittsburgh convention of 1916. Since that year the Southern Supply and Machinery Association has held its own conventions, and original plans had called for a continuance of this plan for 1921. However, because of the weighty problems before the industry throughout the country, the executive committee of the association decided at a conference last week to accept the invitation of the two other organizations to meet with them in Atlantic City.

The Singer Mfg. Co., sewing machines, Elizabethport, N. J., because of decreased demand, has reduced working time to a 5-day week.

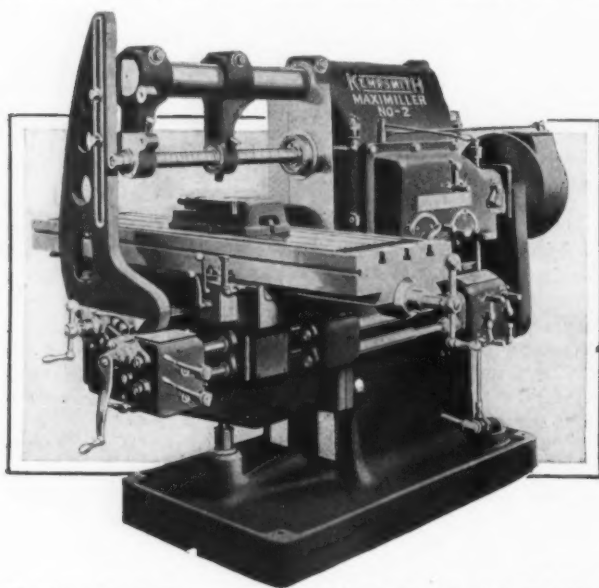


## Milling Machine for Medium Heavy Work

The Kempsmith Mfg. Co., Milwaukee, has placed on the market No. 2 plain Maximiller, a milling machine adapted to medium heavy classes of work. It has a number of features in common with the No. 4 vertical Maximiller described in THE IRON AGE, issue March 11, page 738.

The knee is of the solid top design, there being no openings in the top plate of the knee, and only two small openings in the side wall. This construction serves to resist clamping strains and the torsional effect of the table overhang. The cross-feed screw is located in a shallow depression in the top of the knee midway between the saddle V's. Maximum strength and accuracy was sought in this construction with due attention to the fact that the pull, or thrust, of the cross-feed screw is applied to the center of the saddle.

The column is ribbed internally and has few and small openings. The reservoir for the speed drive oil forms a solid rib, or cross member, midway of the



Eighteen Feed Changes and 18 Spindle Speeds Are Provided for Medium Heavy Classes of Work on Kempsmith No. 2 Plain Maximiller

column height, thus stiffening the column. The drive to the table is near the end of the saddle which leaves the center solid, where the most strain comes. The table is 12 in. wide with 56 in. working surface length. The table gib is of adjustable taper type with locked adjustment.

The overarm is the company's patented "wedge lock" type which keeps the arbor in alignment with the spindle at all times. The harness or out-board support, is the open side type permitting easy access to the work. The spindle nose is of the Kempsmith patented type which provides for driving face milling cutters in either direction and also permits cutters to be quickly removed.

Right-hand design has been used which means that normal direction of spindle rotation is correct for standard drills and boring tools. A spindle reverse has been incorporated in the machine for the reason that in order to get cutting strains in proper direction on gibs and tables a face mill must be run in the opposite direction to a spiral or slab mill.

The clutch is of friction plate type operated by hand lever and is adjustable for wear without dismantling the unit. The brake operating on the reverse throw of the clutch lever overcomes the momentum of the spindle gear train and stops the spindle quickly. The drive pulley is mounted on ball bearings and with the clutch is inclosed in a protecting housing.

Control of the longitudinal movement is by two levers, one for feed and one for the power quick traverse. The knee and saddle movements are both controlled by a second set of two levers, the unit which shall move being determined by push pins located in close proximity to the respective hand feed handles; while feed or quick traverse is determined by which

lever is pushed. The operator can control the movement of the table in any direction either by power feed or quick traverse without moving from his position at the front of the knee.

The feed change mechanism provides 18 changes of feed ranging from  $\frac{1}{8}$  in. to 25 in. per min. in geometrical progression. The power quick traverse is available for all table movements, without disturbing the set up for whatever rate of feed may be in use. The available feed rates remain constant, but the power quick traverse rate has been reduced for the cross and vertical feeds to compensate for the short travel distance of the former and the greater load in the latter case. The longitudinal power quick traverse is at the rate of 100 in. per min. while the cross and vertical travel is at the rate of 36 in. per min.

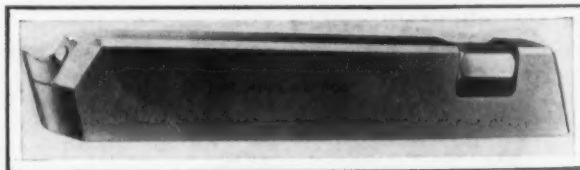
The drive is of the single pulley type through a train of gears giving 18 changes of spindle speed ranging from 16 to 400 r.p.m. All speed changes are secured by sliding gears, there being no tumbler gears, clutches or locking pins. The machine can be furnished, arranged for motor drive through belt.

The cooling system is a part of the machine. The pump is of the centrifugal type driven through a clutch which can be disengaged if the nature of the work does not require the use of a cooling fluid.

## Heavy Duty Tool Holder

A tool holder of new design and intended for heavy-duty high-speed work is shown in the accompanying illustration. It is being marketed under the trade name Wilkes by the lessee, W. A. Schurmann, secretary and treasurer Dawson Tool Corporation, Fifty-first Street and Lancaster Avenue, Philadelphia.

It is explained that there is no more wrench movement required to fasten the cutter in place than is required by other types of cutters; also there are no complicated parts to get out of order. Absence of a set screw is emphasized as a feature. Efficiency is increased by the bit being fastened at close proximity to the cutting point, together with the strong support provided under the cutting edge. This construction, it is pointed out, also reduces the breakage and makes



Tool Holder for Heavy Duty High Speed Work

it possible to cut close to the work, thus to eliminate vibration and chattering. The holder can be taken from the tool post "toward" the operator in place of "from" the operator without disturbing the position or focus of the work.

## Concentrating Company Acquires Water Front

The New Jersey Concentrating Co. has acquired spacious water-front property in Elizabethport, N. J. The company grinds, concentrates, separates and stores metals, minerals, etc., such as manganese, chrome, etc. A 300 ft. private dock allows vessels to berth alongside the plant. Railroad siding along the entire length of the dock affords unloading from steamer into cars for bulk shipments. Additional railroad siding allows the simultaneous handling of 15 to 20 cars. Crushers, rolls, sampling floors, etc., afford sampling while loading or unloading steamers or cars.

Scientific Paper No. 395 of the Bureau of Standards, "Relation of the High-Temperature Treatment of High-Speed Steel to Secondary Hardening and Red Hardness," discusses the physical changes accompanying the heat treatment of high-speed steel and studies the explanations offered of certain anomalies characteristic of this steel. The significance of the physical changes observed and their relation to the same phenomena in simple carbon steels are noted.



# Rail Shortage Estimated at 12,000,000 Tons\*

Annual Output of 4,500,000 Tons Needed for  
Five Years or Beyond Country's Capacity  
—Urgent Questions of Mill Practices

—BY CHARLES W. GENNET, JR.†—

SOME time ago I estimated that there was a shortage of 10,000,000 tons of rails in the United States as of Jan. 1, 1917.‡ This figure was reached by taking account of the annual consumption of rails for 24 years and the increased mileage of the roads reporting to the Interstate Commerce Commission for the same period. The shortage mentioned could be defined as the amount of rail of 85-lb. section necessary to put the roads in a prime physical condition typical of good practice necessary for handling the heavy equipment and traffic desired. No particular reason has developed for modifying the calculated shortage of 10,000,000 tons then existing, but the three years of Government control requires that an addition of probably 2,000,000 tons be made to it, so that 12,000,000 tons really represents the actual shortage to-day.

## Four Lines Require 4,000,000 Tons of 85-lb. Rails

This large deficiency may seem unreasonable, but a moment's reflection and the fact that it implies bringing the roads to a prime condition will perhaps show its consistency. In this connection it is surprising to note the large amount of light section rails existing on important lines where motive power and rolling stock are not only constantly increasing in weight, but where traffic is becoming much heavier. For example, on ten important railroads (namely, New Haven, Seaboard, Louisville & Nashville, Santa Fe, Rock Island, Missouri Pacific, Great Northern, Union Pacific, Northern Pacific and Southern Pacific) there was approximately 32,500 miles of rail weighing less than 80 lb. per yard at the beginning of 1917. No doubt, a large part of this was laid on other than main line track, the figures for such instances not being available, but four of the roads mentioned are reported as having over 10,000 miles of this light rail in places where its removal appears an early essential. Replacing this 32,500 miles with 85-lb. rail would require over 4,000,000 tons of new steel, or 30 per cent of the country's calculated shortage and apparently even then only a few of the high spots have been touched.

The shortage can be estimated in another way, with reference principally to the general upkeep of the roads since 1914, when the great war started. For six years prior to 1914 the total consumption—meaning production plus imports and minus exports—of all rails in the United States was 16,085,000 tons, or an average per year of 2,680,000 tons. For the six years 1914 to 1919, inclusive, the total consumption was 12,124,000 tons, or an average of 2,020,000 tons. Thus, the total deficiency in consumption for six years is approximately 4,000,000 tons, to which must be added probably a million tons more for the year now ending. In other words, 5,000,000 tons of rail should be provided at once to balance the rate of consumption that existed for six years prior to the war, and, needless to say, this figure takes no account of the tremendously increased volume of traffic which has worn out rails with great rapidity in the last few years.

## Five Year Output Needed of 22,500,000 Tons

Calculations, therefore, indicate that as an emergency measure 5,000,000 tons should be immediately furnished the roads, while in addition there is an apparent shortage of 7,000,000 tons more necessary to put the roads in the proper physical condition. These tonnages, representing deficiencies, must be supplied over and above the normal consumption, which for a con-

siderable period prior to the war averaged about 2,800,000 tons annually. A very conservative estimate then shows, after making allowance for rates of renewal, which cannot be accurately calculated, and allowing 500,000 tons per year for export purposes, that the country's rail mills should be called on to produce at least 4,500,000 tons of rails per year for the next five years to insure a return to normalcy. I fear that the chances of obtaining this enormous tonnage of rails are not bright.

For many years, up to say 1906, the country's production of steel ingots and rails increased proportionately, rails then being regarded as one of the principal, if not the chief, tonnage factors of ingot production. As high as 30 per cent. of the total ingot supply had been rolled into rails, and in 1906, the banner year of rail production, when 3,977,000 tons was rolled, about 18 per cent of all the ingots produced were made into rails. Ingot production has steadily and rapidly increased, and in 1917 it was practically double that of 1906. But rail production has almost as steadily and rapidly declined, and in 1917, when all ingot production records were broken, the tonnage of rails rolled amounted to only 6½ per cent of the tonnage of ingots cast. In short, doubling the country's ingot production has apparently resulted in decreasing the rail capacity rather than in adding to it. This, of course, is due to the greatly increased demand for steel products of all descriptions.

## Decreasing Importance of Rails in Steel Production

In the last few years there has been a much larger tonnage of rods rolled for wire drawing than there has of rails, while at the same time the production of sheared plates has passed that of rails, and steel for pipe purposes is about equal to the production of rails. The demand for these miscellaneous products and the lessened demand for rails has resulted in some cases of forcing rails into the background to such an extent that it is doubtful that the rail mills of the country to-day have the actual capacity that they had ten or fifteen years ago.

It must not be supposed that any rail mills have been really abandoned. The point is that the demand for other products than rails has become so great that manufacturers have increased their ingot capacity to take care of it, and in some cases found a way to take care of it by utilizing the existing rail mills to roll those products. But the balance of a few years ago has frequently been lost. At Ensley, for example, the construction of large plate and structural mills has diverted a considerable tonnage of their steel to those mills, thus leaving the rail mill idle a large share of the time. South Works, Chicago, for many years a leading producer of rails, has been practically converted to other purposes, and while rails could still be made there easily in abundant quantities, it would be at the expense of making rods or pipe steel, for both of which products there is a crying need. The fact remains that rails cannot be rolled to-day in the proportion of other days without sacrificing an amount of steel perhaps badly needed in other work.

## Country's Capacity Possibly 3,500,000 Tons

It is very difficult to estimate the country's capacity for producing rails to-day, because of these confused conditions. Probably with sufficient insistence the 1906 record of nearly 4,000,000 tons could be reached, but, as pointed out, this could only be done by decreasing production of some other products not now easily contem-

\*From a paper read before the Western Society of Engineers, Chicago, Nov. 18.

†Robert W. Hunt & Co., engineers, Chicago.

‡THE IRON AGE, Dec. 27, 1917.

(Continued on page 1513)

## THE GAYLEY DRY BLAST

### Reasons for Its Failure Under British Conditions —Heat and Fuel Consumption

In a paper, "Variations in the Heat Supplied to the Blast Furnace and Their Effect on the Fuel Consumption," by W. W. Hollings before the Iron and Steel Institute in London, Sept. 21 to 22, the author offered a theory to account for the saving in fuel realized by Neilson with his hot blast and by Gayley with his dry blast. He also furnished his explanation for the non-success of the Gayley dry blast under British conditions.

He pointed out that in a specific instance quoted by Lowthian Bell an increase in the temperature of the air from 60 to 450 deg. Fahr. reduced the coke consumption from 60 to 38 cwt. per ton of pig iron, a saving of 36.66 per cent. Now per ton unit of carbon burned in the furnace this increase in the blast temperature would mean the addition of roughly 300 cal. to the hearth, an amount of heat equivalent to 2.43 cwt. of carbon burned to carbon monoxide before the tuyères, or a saving of only 12.15 per cent. Similarly, it would appear from Gayley's original account that by drying the air—and incidentally increasing its temperature from 382 to 465 deg. C.—he reduced his coke consumption from 2147 to 1726 lb. per ton of pig iron, a saving of 19.61 per cent., whereas on any theory hitherto advanced the maximum saving possible was between 12 and 13 per cent.

On the publication of Gayley's results in 1904 the Brymbo Steel Co., like many others, were attracted by the seeming possibility of a considerable reduction in fuel consumption. The average moisture in the atmosphere at Brymbo was found to be just over 3 grains per cu. ft., and no difficulty was anticipated in reducing it to about one grain. It was assumed that if Gayley, by reducing the moisture in his blast from 5.56 to 1.75 grains, or by 3.9 grains per cu. ft., was able to save practically 20 per cent. in his fuel, an economy of not less than 10 per cent. should be obtainable by a reduction of two grains. But when in 1909

a plant for drying the air was installed, the actual saving was only 3.34 per cent.

The proposition advanced in the paper is that any variation in the amount of heat supplied to the blast furnace involves a secondary and complementary series of changes in the amount of heat produced and absorbed internally; and the proportion borne to the initial variation by its complementary internal change constitutes the ratio of an infinite geometric series having the primary variation as its first term. For example, suppose the net increment of heat in the furnace directly resulting from the addition of 200 cal. amounts to 144 cal., then these 144 cal. will in turn be responsible for a further addition of  $144/200$  of 144, and so on. If  $a$  represents the initial variation and  $r$  the proportion borne to it by its complementary internal change, the total variation will be the sum of the geometric series, or  $a(1-r)$ , which with  $a = 200$  and  $r = 0.72$  will amount to 714.3 cal.; and this will be the ultimate calorific effect on the furnace caused by the addition of 200 cal.

Application of the theory to the figures of Gayley's original trial gives the theoretical saving as 21.92 per cent., of which 11.34 per cent. would be due to the drying and 10.55 per cent. to the increase in blast temperature. At Brymbo for a reduction of moisture from 3.1 to 1.3 grain per cu. ft. the theoretical saving was only 2.18 per cent., against 3.34 per cent. actually obtained. Here the drying of the air was slightly offset by a diminution in its temperature. In both cases the theoretical results would have been brought more nearly into line with the practical had it been possible to include tuyère water losses.

The author deduced from his premises that for countries with such a low average absolute moisture as England it does not pay to install the dry blast; that crushing the materials of the charge to a uniform size may be expected to result in a considerable economy of fuel per ton of pig iron; and that for a small percentage of oxygen the process of blowing with oxygen-enriched air is not likely to produce any appreciable saving.

## Railroad Accidents Due to Defective Steel

Some insight into the amount of defective iron and steel entering railroad equipment is given in the report of the Interstate Commerce Commission for 1919, known as "Accident Bulletin No. 74." During this year in the United States, there were 11,118 train accidents "caused by defects in, or failures of, equipment," in which 39 were killed and 1266 were injured. In the same year, there were 3775 train accidents, "caused by defects in, or improper maintenance of, way and structures," in which 36 were killed and 1060 were injured.

Under the classification of equipment failures were 2807 accidents in which 11 were killed due to faulty wheels and axles. Due to the breaking of cast iron wheels 339 accidents occurred; cast steel wheels, 22 accidents; forged steel wheels, two accidents. The most prevalent cause under this classification was the breaking or cracking of wheel flanges, resulting in 546 accidents. Worn wheel flanges caused 223 accidents. Fifty-nine accidents were caused by the breaking of wheel treads; 18 by wheels out of gage. Bent or broken axles caused 289 accidents; broken journals brought about 723 accidents, of which 351 were due to overheating and hence not attributable to defects.

Failures of trucks caused 2247 accidents, 678 being attributed to arch bars, bolts, etc., bent, broken, or other failure; 363 accidents were due to truck frames, which bent, broke, twisted or suffered other failure. Of the 1180 accidents due to hand brakes, brake rigging and appurtenances, 493 were caused by brake beams broken, disconnected, misplaced, etc.

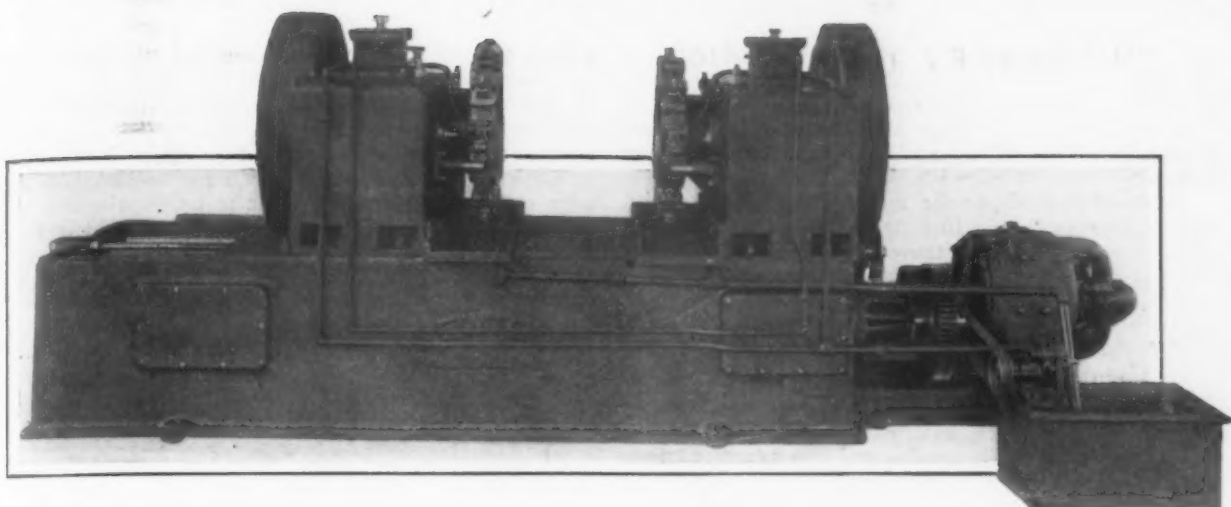
Under the classification of defects in, or improper maintenance of way, there were 1311 accidents caused by bad rails or joints, 631 of which were attributable to broken rails, in which 10 persons were killed. Four accidents were caused by a flow of metal in the rail;

seven by crushed heads; 42 by split heads; 25 by split webs; 11 by broken bases; other forms of rail failures, not due to wear, 19. Of the 653 accidents due to frogs and switches, 126 were brought about by the bending or springing of switch points.

There were 19 accidents in which the defect was in a bridge, trestle, culvert, or tunnel. Four of these accidents were due to structural defect or failure of bridges, and four due to structural defect or failure of trestles.

Lack of more complete statistics makes it difficult to draw definite conclusions. If it were possible to obtain the number of various kinds of wheels used on the United States railroads, it would be possible to compute fairly accurately what kind of wheel is best—whether cast-iron, cast-steel, or forged. On the face of things, it would appear that cast-iron wheels are the least satisfactory from the fact that 339 accidents were attributable to them, whereas but 22 accidents were laid to cast-steel wheels, and two to forged steel wheels. Undoubtedly, however, there are more cast-iron wheels than those of other kinds and hence the liability to accident is greater. The Association of Manufacturers of Chilled Car Wheels, representing 48 wheel foundries, claim that 95 per cent. of the car wheels in the country are of chilled cast iron. According to the figures of the Interstate Commerce Commission for 1919, they figured in 93 1/3 per cent. of the accidents, which might indicate that this class of wheel is slightly better than the others.

The recent acquiring of control of the General Motors Corporation by the Morgan-Dupont interests is regarded as a favorable factor in the general business situation as showing the confidence of great industrial leaders that the automobile business will recover and get upon a sound basis before a long period has elapsed.

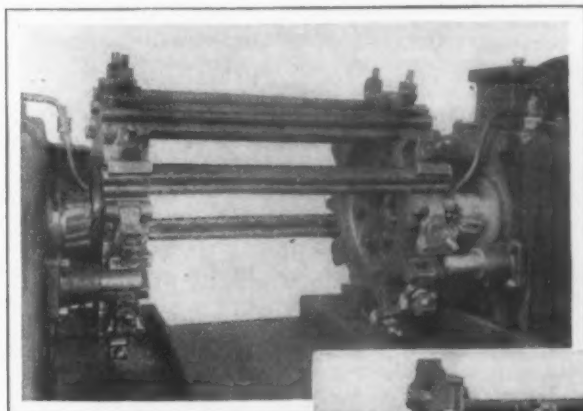


### Continuous Type Facing Machine

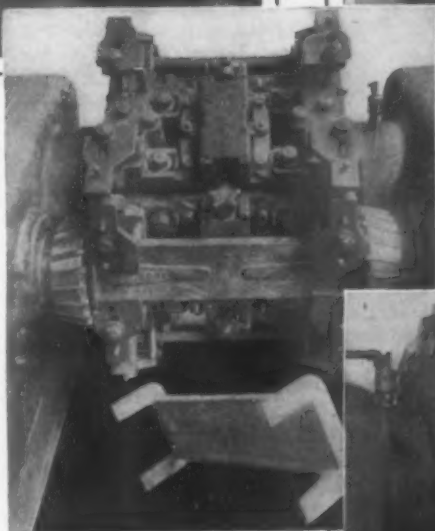
A machine of continuous type for facing work of various size and character to length and a recent development of the Newton Machine Tool Works, Twenty-third and Vine streets, Philadelphia, is shown in the accompanying illustrations. One head is mounted stationary at the end of the base and the other head is adjustable, so as to take work of varying lengths. There is individual adjustment to each cutter spindle for setting the depth of cut. All bearings are oiled by a cascade system of lubrication, so that the machine requires only an unskilled operator who can be taught the simple operation of inserting and removing the pieces from the jig. The cutter spindles are driven by worms and worm wheels. The drum spindles are revolved by gears both of which are driven from a common pinion shaft thus to eliminate possibility of their being out of register one with the other.

One of the accompanying illustrations shows shafts 1½ in. in diameter being faced to length. Production is given as 250 pieces per hour. For this operation the intermittent feed and rapid traverse mechanism is used, that is to say, when the pocket containing the pieces has revolved past the milling cutters, the feed automatically trips and engages the rapid traverse which advances the work holding drums at a ratio of 10 to 1, and just before the next pocket containing the shafts is reached, the rapid traverse is tripped re-engaging the feed motion. The loading of the drums is performed on the machine opposite to the side shown in the illustration. The declampage and unloading of the drum for this operation is performed automatically. The clampage is by a toggle lever which, as the drum rotates, is released by coming in contact with the two studs bolted to the housing. This allows the shafts to roll on to the pans which have an inclined surface, so that they can roll down into a tote box or in some cases upon a roller conveyor. In this particular application there are ten stations or pockets on the drum, each holding three of the shafts in question.

Another illustration shows the machine set up for



Work of Various Size and Character Being Milled to Length on Newton Continuous Type Facing Machine. From left to right, the views show: Shafts 1½ in. in diameter being faced to length; machining both ends of 6-throw crankshafts, placed alternately to bring them close together; machining both ends of cast-iron frame supported by elaborate jiggling to prevent distortion; camshafts, located by universal chuck in the center, being machined on both ends





machining both ends of a six-throw crankshaft. The jig locates the crankshaft by the plungers in the center and they are placed alternately, which brings them so close together that the jump mechanism is not required on the operation. The production is given as 90 per hour.

Another view shows the method of machining both ends of camshafts. In this jig the camshaft is located by a universal chuck in the center, working from the

center bearing. These pieces are also placed so close together that the jump feed is not employed on the operation. Production on these camshafts is given as 180 per hour.

One view shows a cast iron frame which is machined on both ends and owing to its light section requires very elaborate jiggling in order to be certain that the piece is machined without distortion. Production on these pieces is at the rate of 45 per hour.

## Why American Freight Rates Are Low

The *Railway Age* gives statistics of the operation of American and British railroads during the first six months of 1920. The article was prepared by the Bureau of Railway Economics and the figures regarding the British railroads are the first of the kind ever available. The average freight rate per ton per mile on the British railroads, which are still under government control, was, in the first six months of the year, 26.3 mills, exclusive of charges for the collection and delivery of freight to and from the railroad stations. The average rate on American railroads in the same period was 9.7 mills, or about one-third as great. The principal reason why American railroads can haul freight at an average rate only one-third as great as that of the British railroads is that they handle it in so much larger units—that is, in so much larger carloads and train loads. The average number of tons carried in each train by the British railroads was only 150, while in the United States it was 710. The average number of cars in each freight train in England was 35, which is about the same as the average number of cars in an American freight train, but the average load carried in each car in England was only 6 tons, while in the United States it was about 28 tons. It was, of course, this great difference in the average number of tons carried in each car which was chiefly responsible for the much larger number of tons carried in each train in the United States.

The average miles each car was moved daily on the railroads of the United States during the first six months of the year was only 23, but within recent months it has been increased to about 27. The cars on the British railroads are much smaller and carry much smaller loads, and it might be expected that they were moved more miles per day than those of American railroads, but the average miles traveled by each car on the British railroads was only 10.63, or less than half the mileage made by cars in this country. The average time daily that each British car was actually moving in trains was only 1.41 hours, while the average time it was being switched in yards or to industries, or standing awaiting repairs, was 22.6 hours.

## New Steel Plant in Canada

WASHINGTON, Nov. 29.—Consul General J. I. Britain, Winnipeg, Manitoba, states that the first open-hearth reverberatory furnace in Manitoba recently commenced operations at Selkirk, about 10 miles northeast of Winnipeg.

The plant, which represents an investment of about \$1,000,000, is known as the Manitoba Rolling Mills, and its equipment is said to be of the most modern type, consisting principally of one 15-ton furnace, three 15-ton ladles, crane, dumps, molds and other machinery. Electricity is supplied by the Winnipeg hydroelectric stations.

It is expected that the surrounding territory will furnish an ample quantity of steel scrap.

The fuel used by the new rolling mill is Canadian bituminous coal, crushed into 1-inch cubes, elevated into a hopper, passed through a dryer, and from there into a pulverizer.

Orders have been received which will engage the output for several months, it is reported, but shortage of labor, high freight rates, and the scarcity and high cost of raw materials imported from the United States are said to have hindered capacity production. It is expected that the output of this plant will supply in a measure the demands of the market in western Canada

and that additional units will be equipped as fast as business warrants.

## Record-Breaking Exports in October

WASHINGTON, Nov. 30.—Instead of a further slump in exports the October total showed a surprising increase. The total for the month was \$752,000,000, which was \$147,000,000 greater than the September total of \$605,000,000 and \$120,000,000 greater than the \$632,000,000 total of October, 1919. It formed the third largest total on record, being exceeded only by the total of March, 1920, which was \$820,000,000, and by that of June, 1919, when it reached \$928,000,000.

Imports declined slightly in October, the total being \$362,000,000 as against \$363,000,000 in September. Both of these totals were considerably below those which prevailed earlier in the year. The record import total was in June, 1920, when it reached \$552,000,000. In July it fell off to \$537,000,000, in August to \$513,000,000 and in September the drop was more marked.

In August fears were expressed because the excess of exports over imports amounted only to \$65,000,000. The excess in October, \$390,000,000, is the largest of any month of this year.

Exports for the 10 months ending with October totaled \$6,832,000,000, a slight increase over the total of \$6,499,000,000 in the 10 months period of last year. Imports for the 10 months period amounted to \$4,720,000,000, which is more than one and one-half times the imports of \$3,099,000,000 in the 10 months period of last year.

## Hardware Association Officers Honored

The New England members of the American Iron, Steel and Heavy Hardware Association, on the evening of Nov. 18, gave a complimentary dinner at the Algonquin Club, Boston, to officers and executive committee of that organization, following a meeting of the committee at the Copley-Plaza. In the neighborhood of 150 attended the dinner.

The toastmaster was Edward P. Sanderson. Prof. C. J. Bullock told of his work at Harvard in connection with the collecting of statistics for the purpose of determining, if possible, a forecast of business conditions. While his department is not willing to commit itself, it is inclined to believe that a turn for the better in business conditions will come about April next.

A. J. Lockwood, in speaking along political lines, paid a tribute to President Wilson and President-elect Harding, and held up Lincoln as an example for all presidents. He displayed a picture of Lincoln on the front cover of *THE IRON AGE*, Aug. 5, 1920, and, referring to *THE IRON AGE* as the bible of the steel industry, paid high tribute to it.

Other speakers were: Eugene J. McCarthy, Beals, McCarthy & Rogers, Inc., Buffalo, president of the association; Andrew Wheeler, Morris Wheeler & Co., Philadelphia; F. H. Payne, Greenfield Tap & Die Corporation, Greenfield, Mass.; George W. Denyven, Boston; E. F. Yarnelle, American Horse Shoe Co., Phillipsburg, N. J., and Rev. F. E. Webster, Waltham, Mass.

Plans were laid Nov. 23 for the formation of a Mechanical Section of the Engineers' Club in the Youngstown district. Stanley H. McNee, chief engineer, and G. C. Emmons, efficiency engineer respectively of the Republic Iron & Steel Co., led a discussion on the construction and operation of the water treating plant for boiler feed water.

# Better Industrial Situation in Detroit

Notes of Optimism Being Heard for First Time in Several Months—Plants Continue to Run as in Past—Employment Figures Holding Their Own—Few Wage Reductions

DETROIT, Nov. 29.—During the past week a distinctly improved situation is noted in Detroit. Up to that time business had gradually been slowing down, abruptly in some instances and just tapering off in more fortunate cases. It has been difficult, if not impossible, to get at the exact truth regarding the actual working conditions in the automobile business here owing to the natural reluctance of employers to admit the extent of the depression that has prevailed in this industry.

Now for the first time the heads of businesses are willing to talk for indirect publication. Not all are willing, however, and it is necessary to estimate the exact condition of some of the most important plants from information gathered from various sources and pieced together. Such estimates are not exact, naturally.

Using the most reliable statistics that can be gathered, it is estimated that about one-quarter of the men employed throughout the city six or eight months ago have been discharged or laid off indefinitely. About two-thirds of those remaining are working on definitely reduced hours. The hours worked will average 38 per week against a normal of 50 hours per week. This accounts only for those plants working on regular short hour or less than six day per week schedule. Some plants have been closing for a day or two at a time irregularly, and are not accounted for in this estimate.

## Statistics as to Employment

In actual figures, the Employers' Association of Detroit comprises all of the large plants, and employs about two-thirds of those engaged in all kinds of labor in the city. Exact records of the payrolls of all plants included are kept in the office of the association, are brought up to date weekly, and are therefore reliable. At the peak of business on April 1 this year there was a total of 198,700 workers on these payrolls. This week the figure is 146,000, a reduction of 26 per cent. Estimates by the Detroit Board of Commerce, the Labor Department of Michigan, the Employers' Association and others place the actual workers employed in the city between 300,000 and 310,000. An average of 26 per cent out of work would give some 78,000. About half of these have left the city, and of the remainder some 10,000 are floaters who do not wish to work regularly. This leaves about 40,000 men out of work who would work if they could find jobs, and 100,000 working short hours.

## Reduction of Wages Discussed

Nothing definite or in the nature of a concerted movement has been done about reducing wages. Employers talked the situation over last week. The general conclusion arrived at was that until general living expenses drop to a noticeable degree it would be unfair and unwise to make any general reduction in wages. Rents have been raised exorbitantly in this city, jumps of \$10, \$20 and up to \$40 a month being so common as to cause no remark. These raises have been on small houses and flats, the homes of workmen, who had to pay the increase as there was no place to move to. Rents have not been lowered, and in fact increases have been demanded within the last month. Most of those who have left the city were the floating workers who lived in furnished rooms, those having families and occupying flats or houses staying in the hope of improvement. The housing situation, therefore, has not been much improved, and while some places are now offered for rent, no reductions are offered, or such slight ones compared with the increases previously made as to be of no practical advantage. Food prices remain as high as ever in spite of the drop in the wholesale price of meats and groceries. The coal situation has eased off and prices of \$10.50 per ton for the soft coal in general

use here for domestic heating have been recently advertised. This is of little benefit, however, to the forehanded man who filled his cellar during the summer as he was urged to do by all those to whom he naturally looked for advice, as he paid \$15 to \$17 for his soft coal and \$20 to \$22 for hard coal.

## Wages of Common Labor

Common labor commanded 60 and 65 cents an hour during the summer. This has dropped generally to 50 and 55 cents. Men could be had in plenty at 35 or 40 cents, but this price is considered unfair and is not being offered. Some other classes of labor have been variously reduced, and in different ways. Piece rates that were set so high that wages all out of reason were earned are being revised. In one automobile plant that has paid the highest wages, outside labor has been changed from 65 to 60 cents, inside labor from 60 to 55, and lumber handlers from 75 to 66. Inside stock handlers who made as high as 80 and 85 cents on a gang-premium basis have been put on a flat day rate of 60 cents. The head of this company said last week that with present living costs he does not consider \$1 an hour unreasonable for skilled workers, and until living expenses drop he will not reduce their general rates throughout the plant.

A factory making automobile springs is still laying off men, weeding out the less efficient workers. It is taking on a few men laid off at other plants who come to it especially recommended, but is not hiring them at less wages than it has been paying right along for this class of labor. The policy of this company is not to cut wages under present conditions.

## Ford Motor Co. Policy

It is understood that the Ford Motor Co. has not laid off any men, but is not replacing the men who normally leave the company, averaging somewhere around 100 a day. This plant employs two day shifts and one night shift, of eight hours each. The day shifts are working the full number of hours five days a week. The night shift is working four nights a week. The men are rotated, two weeks days and one week nights. Workmen here as well as elsewhere are reported as anxious to work hard to keep their jobs. It is understood that by extra effort production has been maintained and in some departments has even been increased even with fewer working days per week. Present plans are said to comprise the regular two-week shutdown commencing Dec. 15 and reopening Jan. 3.

One plant making a medium priced car whose normal output is 75 cars a day was down to 10 a day during October, but is turning out 10 open and 15 closed jobs a day this month.

A factory turning out one of the highest priced cars is planning to turn out its planned 1920 production schedule of 20,000 cars, ending toward the last of December. As enough parts are completed to fill out the schedule the men working on those jobs are laid off. No plans have yet been made for next year.

## Important Decision Pending

One of the largest factories in the city, turning out 625 cars a day, has been running at full capacity till the last two weeks, when a two-day-a-week schedule was adopted. This company had nearly decided to curtail production definitely at something like this rate, and a decision is being made as this article goes forward. An increase in definite orders calling for immediate shipment has begun in such decided shape and reports from dealers to whom assistance was offered in carrying stocks has been so uniformly to the effect that such financial assistance is not necessary, that this policy has been put in abeyance. A week ago if the decision



had been necessary there is no question that it would have been to curtail drastically. The change has been so noticeable that it is almost certain that such action will be put off for a month at least to see what the future brings forth. This company is proceeding with completion of a \$12,000,000 addition, on which 2000 men have been engaged all summer. The addition is not so much to increase production as to give more room in which to continue its present schedule, with more air and light for the workers.

A factor noted in this plant which has a decided effect on production is the fewer number of absentees. An average daily absence of 13 per cent has been reduced to less than 3 per cent. This actually works out the same as a 10 per cent addition to the forces, and its apparent effect is to result in the laying off of that number of men while maintaining normal production. This same condition applies to other plants in the city, resulting in production which is greater than would be thought from the number of men laid off.

### Dominion Plant Stops Operations

When 125 railroad employees of the Dominion Steel Corporation, Sydney, N. S., served an ultimatum on the management Nov. 22, demanding a settlement of their wage differences before five o'clock the same day, the company replied by closing down the various mills at noon and ordering the banking of the blast furnaces. This action automatically threw 4000 men out of employment, pending the settlement of the dispute with the railroad workers. It is estimated that it will require at least a week to get the furnaces in operation again and it is likely that the plant will be tied up for that length at least, with a possibility that the entire staff may not be employed again inside a month's time. The company, it is understood, is making application to Ottawa for redress, under the provisions of the industrial disputes act. It is announced that lack of orders has been threatening the operations of the steel plants for some weeks, and the resumption of business depends not alone on the settlement of this strike, but also on the company securing additional orders. For the past two years the railroaders employed within the steel plant have been contending for the scale of wages awarded all other railroad workers in Canada following the McAdoo award in the United States.

### In the Field of Labor

An intensive campaign to unionize inside iron workers of the East Boston district is planned by A. F. L. agents.

Official announcement is made that the New York, New Haven & Hartford Railroad plans a further reduction in shop and general forces, the total number to be affected being 3000 or 10 per cent of the working force.

The Eastern Malleable Iron Co., Naugatuck, Conn., and other leading manufacturing concerns there have adopted a factory saving plan whereby employees may deposit savings with the foreman of their department. Through the foreman these savings will be deposited with the plant's department of savings, which will work in co-operation with the Naugatuck Savings Bank, the final custodian of the savings.

The Fafnir Bearing Co., New Britain, Conn., closed Nov. 23 for an indefinite period. The management hopes to reopen the plant by Jan. 1.

The Western Electric Co., Chicago, has increased the working force at its plant at Hawthorne, near Chicago, to 22,000 operatives, as against 15,358 engaged at the plant this time a year ago. The plant covers an area of about 210 acres, and is used primarily for the manufacture of telephone equipment.

In broad retrenchment programs, railroads serving the Youngstown district are laying off large numbers of yard, train and shop men. W. A. Baldwin, manager of the Ohio region of the Erie Railroad, estimates about 1400 employees, or 10 per cent of the total working force between Salamanca and Dayton, will be affected by that company's program. The Baltimore & Ohio is planning to reduce its forces in some of the central districts by 30 per cent.

The labor supply in Wisconsin was in excess of the

demand for many kinds of work during October, according to a report of the State Industrial Commission. The actual number of male applicants was 96 per cent of the demand, but this is accounted for by the fact that there was a great demand for lumber workers, which has now been met, the commission states. An excess of labor was shown in all clerical positions and in all semi-skilled lines, as well as in many skilled occupations.

The Merchants and Manufacturers' Association, Baltimore, has taken steps looking toward a campaign of education to point out the advantages of the open shop. A. S. Goldsborough, director of the Civic and Industrial Bureau of the association, has sent out a letter to a number of merchants and manufacturers.

Employees of the Indiana Aluminum Ware Co., Elkhart, Ind., have voted to accept a 10 per cent reduction in wages, amounting on the average to 6 cents an hour, for both office and plant force. The vote followed an explanation by Howard Church, manager, that a cut would be necessary.

The third annual nominations and elections for employees' representatives from all divisions, as provided in the representation plan in effect at the plants of the Youngstown Sheet & Tube Co., Youngstown, Ohio, will take place in December. The nominations will be held Dec. 7 and the elections Dec. 10, and will be entirely in charge of the workers.

### Reduced Operations at Youngstown

YOUNGSTOWN, OHIO, Nov. 30.—Usual holiday suspensions of Valley iron and steel plants will be longer than ordinarily this year on account of business conditions. Some departments will be closed Dec. 15 by the larger interests and will remain down until resumption is justified by new orders. In the meantime, working forces are being still further depleted, the process extending from mechanical forces to drawing room and engineering staffs. Where possible, mills are practising the economy they are preaching to employees.

Workers, on the other hand, appreciate the growing volume of unemployment and it is considered likely in some influential quarters that they would be willing to accept wage readjustments if such procedure meant steadier employment.

The Carnegie Steel Co. is maintaining 90 per cent schedules, though the average throughout the district is not above 60 per cent. Thirteen of the 15 open-hearth furnaces of the Carnegie company are active and finishing departments proportionately.

Republic Iron & Steel Co., on the other hand, is operating but six of its 14 open-hearth units, with some mills in the Brown-Bonnell works idle, though pipe departments are going strong. The Falcon Steel Co. will continue idle for another week. The Sharon Steel Hoop Co. is operating seven of nine sheet mills at the Haselton works, though the general average of its schedules is much smaller. The Brier Hill Steel Co. is still down to 50 per cent. The A. M. Byers Co. is maintaining a good percentage of production at its Girard plant. Fabricating interests report an improvement in the immediate business outlook and an appreciable acceleration in operations.

One year ago the cornerstone of the Wills automobile plant in Marysville, Mich., was laid. At that time Marysville's population comprised 100 persons. On Monday, Nov. 15, the community celebrated its first anniversary as a city of 1800 population. During the year, 219 houses were built, 65,000 ft. of water mains and 7 miles of sewers laid, 34,000 ft. of sidewalks built and 6½ miles of road improved. The weekly payroll of the city now exceeds \$50,000. The Wills factory is under construction on a 240-acre site.

The city of Seattle, through the Chamber of Commerce and Commercial Club, has started a national advertising campaign to continue for a period of three years, for the purpose of attracting new industries to the city. More than 1100 business men and firms subscribed to a fund for the campaign. It is proposed to raise a fund of \$100,000 per year for three years to meet the expenses.



## CARBON STEEL STUDIES

### Thermal and Physical Changes and Relation Between Grain Size and Hardeners

WASHINGTON, Nov. 29.—The Bureau of Standards has completed two interesting studies concerning hardened and annealed carbon steels. The results of these investigations are included in two scientific papers which are now in the hands of the Government printing office. Because of delays there, however, it is impossible to say just when these documents will be available for distribution.

The first of these investigations covers the thermal and physical changes accompanying the heating of hardened carbon steels and will appear as Scientific Paper No. 396 of the bureau, by Howard Scott and H. Gretchen Movius. In this investigation thermal analysis was used to determine the thermal characteristics of hardened carbon steels below  $A_1$ . A definite heat evolution called  $Ac_1$  was observed for a normal rate of heating starting at about 165 deg. C, reaching a maximum at 270 deg. C, and ending at 290 deg. C; the effect on it of the variables—rate of heating, tempering, carbon content, and quenching temperature—was studied.

The investigation revealed that for a very slow rate of heating this transformation is practically independent of carbon content, and that it then ends at about 260 deg. C. This temperature undoubtedly represents the end of the transition of martensite into the troostite of tempering. The transformation is also closely associated with the physical changes accompanying the tempering of hardened steel.

The report of the investigations contains the following summary of conclusions:

"1. An increase in the rate of heating raises markedly the temperature of  $Ac_1$  for a 0.95 per cent C martensitic steel and has a yet more marked effect for an austenitic carbon steel. For zero rate of heating there appears, however, to be little, if any, difference between the principal temperature, whether the steel is of high or low carbon content or whether it is martensitic or austenitic. The principal temperatures for the 0.95 per cent C martensitic steel were found to be 155, 250 and 260 deg. C., respectively, for the beginning, maximum and end.

"2. The results obtained for specimens tempered at different temperatures before taking heating curves confirms substantially the temperature of the end of  $Ac_1$  just given.

"3. Tempering for a short time at a temperature within the  $Ac_1$  range has an effect on the transformation characteristics similar to tempering for a longer time at a somewhat lower temperature.

"4. The heat evolution of the austenitic steel takes place in two steps, the second being probably connected with the transition from austenite to martensite.

"5. A survey of the changes in some physical properties of martensitic carbon steels through the tempering range leads to the conclusion that these changes are all directly related to the heat evolution observed, but only in the case of the magnetic properties, coercive force, and maximum induction is the change of the same type.

"6. The change in density of a semiaustenitic carbon steel proceeds in steps similar to the heat evolution of the austenitic steel.

"7. The changes in microstructure on tempering martensitic steels are unquestionably related to the heat evolution, but further study is necessary to establish fully this relation. The end point (260 deg. C for zero rate) of  $Ac_1$  may very properly be taken as the natural boundary between martensite and the troostite of tempering, representing as it does the end of the transformation suppressed on rapid cooling."

#### Relations Between Hardness and Grain Size

The second paper contains the results of a study of the relations between the Brinell hardness and the grain size of annealed carbon steels. A description of this investigation is being issued as Scientific Paper No. 397 of the bureau, prepared by Henry S. Rawdon

and Emilio Jimeno Gil, the latter a professor of physical chemistry at the University of Oviedo, Spain.

"In some of the simple alloys a rather definite relation exists between grain size and hardness," says an official abstract of the paper. "A study was made of five types of carbon steel in various conditions of grain size to determine whether such a relation exists for steels. The variations in grain size were produced by annealing for long periods at different temperatures and also by low-temperature annealing after a preliminary straining of the steel. Two methods were used for obtaining the hardness values the standard Brinell apparatus and a small type designated as the 'micro-Brinell' testing set, by which the hardness of the individual grains could be measured."

The summary prepared by the authors contains the following account of the results of the study:

"1. The Brinell hardness was determined for five steels varying in carbon content from a very low value to somewhat above 1 per cent. Each of the steels was treated so as to produce wide variations in grain size, and the hardness was determined in each condition.

"2. Upon heating for six-hour periods no very appreciable increase in the grain size occurs until the  $Ac_1$  transformation in the steel has occurred. The change in grain size often appears to be a very abrupt one; that is, it takes place within a rather narrow range of temperature.

"3. Two methods were used for obtaining the Brinell hardness, one of which was intended to give the hardness of individual crystals or small aggregates as distinct from the average hardness of the material.

"4. The results of the two methods show no appreciable or consistent difference between the hardness of small groups of crystals and the average hardness for the steels investigated.

"5. Although it was impossible to obtain an accurate numerical grain-size determination for many of the specimens, the micrographic examination indicates that there is no simple and direct relation between grain size and Brinell hardness number for carbon steels. A very pronounced increase in grain size is usually accompanied by a decrease in hardness. On the whole, however, grain size appears to be a factor of minor importance in determining the Brinell hardness of carbon steels of the types investigated.

"6. The general effect of heating the steel—that is, upon the properties of the metal after cooling—is to harden it appreciably. This increase is noticeable in spite of a pronounced drop in hardness which accompanies an abrupt increase in grain size. This tendency toward hardening upon heating is not shown by low carbon steels to any extent, thus suggesting that this change in hardness is not a function of the grain size.

"7. The rate at which steels are cooled and consequently the structural condition of the hardening constituent, affects the hardness much more than any other factor.

"8. The hardness measurements upon materials in which a pronounced differential grain growth has been produced by low-temperature annealing after straining the metal are in general accord with the results obtained upon the same steels in which the grain was coarsened by heat alone.

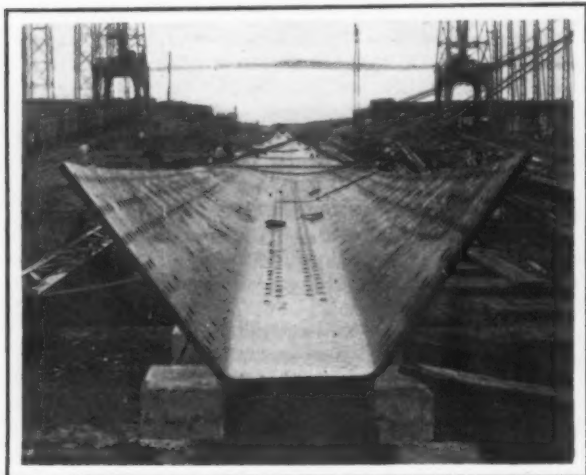
"9. Incidental to the study of the hardness of steels coarsened by annealing after permanent strain, some data were obtained relative to the magnitude of the necessary stress required to cause pronounced grain growth upon annealing such strained metal below the  $Ac_1$  transformation temperature."

Victor E. Karminski & Co., 291 Broadway, New York, exporters of iron and steel, have adopted a new method of submitting offers of tonnages to clients. Instead of sending a long list of materials, a form which resembles a telegram has been printed and headed "Steelogram." Offers of only one kind of material at a time are sent out on this to the consumers. The company notes a better response to this form of offer than to the usual circular. Several of these forms have been sent to customers in foreign markets, but no response has yet been received.

## French Shipyard Appoints American Agent

The Smith-Eisemann Corporation of America, 217 Broadway, New York, iron, steel and machinery exporter dealing largely with French shipyards, has been appointed exclusive purchasing agent for the United States and Canada by the Chantier et Ateliers de St. Nazaire, Penhoet of Paris. It will also be American selling agent for the company.

Chantier et Ateliers de St. Nazaire is one of the leading European shipbuilding companies, with yards at St. Nazaire and Rouen. The former has six modern construction ways and the latter yard eight. More than 9000 workers are employed at the two yards and under normal conditions the annual consumption of steel is in the neighborhood of 80,000 tons of plate, shapes, bars, rivets, bolts, nuts, sheathing and similar material. Some of the largest steamships launched in France have been constructed at these yards. In 1912 "La France" was completed and at present the "Paris,"



American Steel Plate, Part of Keel of Large Oil Tanker

37,000 gross tons, one of the largest and most luxurious vessels ever built in France, is nearing completion. The Chantier et Ateliers de St. Nazaire is also constructing large and small oil tankers, those now on the ways being 9000-ton ships. The accompanying illustration shows a large steel plate of American origin placed in position as part of the keel of one of these large oil tankers at the St. Nazaire yard of the company.

This company uses American steel almost exclusively and during the past year has purchased through the Smith-Eisemann corporation more than 30,000 tons of which 8000 tons still remains to be shipped before the end of 1920. The 10,000-ton cargo ship "Union," launched this month at the St. Nazaire yard for a French account, was built entirely of American steel and American auxiliary machinery supplied by the American agents of the company. The only parts which were of French origin were the engines, built in the shipyard's own plant at St. Nazaire.

Managing Director Boistel and Chief Naval Engineer Maroger of the Chantier et Ateliers de St. Nazaire are now in New York with temporary offices at the Smith-Eisemann corporation.

## Wage Reductions Dec. 1

YOUNGSTOWN, OHIO, Nov. 30.—Wage reductions for employees in various departments will become effective Dec. 1. Manufacturers are developing plans to inaugurate three shifts in some departments now operated on two, to eliminate overtime wages and to afford employment to a larger number of men.

Plans are being made to close the tin mill of N. & G. Taylor, Cumberland, Md., because of the lack of orders.

## Factors Which Determine the Main Roll Drive

Factors which have led to the selection of adjustable-speed motors in preference to the constant speed motor for the main roll drive were discussed by G. E. Stoltz, general engineer Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., in a paper "Factors Which Determine the Selection of Motors for Main Roll Drive," presented at a recent meeting of the Engineers' Society of Western Pennsylvania, Pittsburgh. It was pointed out that an adjustable speed motor cannot only be regulated to obtain the most suitable speed desired for rolling the different sizes of sections, but a variation can be effected when it is desired to obtain a welding effect, or to regulate the flow of the metal due to different temperatures, physical properties or to some irregularity in its cross-section.

### Rotary Converter System

Several well-known systems employing adjustable-speed, alternating-current motor equipments, Mr. Stoltz said, are now on the market, including the constant horse-power, rotary-converter system. "The rotary-converter system," it was explained, "permits a change in speed from time to time as the rolling schedule is modified, but like a direct-current, machine-tool motor, it is not intended to make rapid or extensive changes in speed under load conditions. If it is desired to have the motor respond to changes in speed during normal rolling conditions, it will be found better to install a direct-current motor on the mill, with a motor-generator set, and use the Ward-Leonard system of control. This system is similar to the ordinary reversing mill apparatus, except that the fly-wheel on the motor-generator set may be omitted on mills not having loads of a highly intermittent character." Diagrams of these systems and photographs of installations and curves obtained were shown and discussed in detail.

### Selecting the Driving Equipment

In conclusion, the speaker stated that "installation of a mill should include proper heating furnaces and handling equipment as well as the general arrangement of the mill so as to be able to handle the metal with the necessary despatch to avoid unnecessary loss of temperature; and the driving equipment should be selected to handle the steel to the best advantage, keeping in mind the character of the product to be rolled and the temperature range within which it can be successfully worked. In the majority of cases, a single-speed motor can be used, but there are a number of places where it is possible to meet the proper rolling requirements only with a motor which can have its speed adjusted from time to time, or with one having the Ward-Leonard system of control, making it possible to adjust the speed instantly.

"In addition to this, a study should be made to determine the maximum possible output of the mill and this should cover not only the mill proper, but should start at the furnace and be carried through the finishing department, so that the mill will be balanced throughout. If one or two rolling schedules are selected which require the maximum horse-power on the mill, a motor should be selected with sufficient margin to drive the mill when rolling under these extreme conditions. It is important to have a margin in the motor capacity so that it will not be disturbed when occasionally the temperature of the steel is not up to normal, or the passes are made under unfavorable conditions. If the motor gives trouble under these circumstances, the operating men very often blame it for any deficiencies in quantity or quality of the output rather than blaming the temperature, speed, reduction, etc."

The Carnegie Steel Co., Pittsburgh, has acquired a tract of land at North Braddock, Pa., for a consideration said to be \$100,000. The site, in part, will be used in connection with company welfare work for employees.



# German Steel Consolidations Multiply

Many of Them Manufacture Final Products Into Which Steel Enters—Coal Situation Improves with Promise of Surplus in France and Belgium

(Special Correspondence)

BERLIN, GERMANY, Nov. 8—The chief interest of the iron trade has continued to center around reorganizations and consolidations of companies. This movement has now assumed dimensions which hardly had been dreamed of a half-year ago; and so great is its importance that the German coal and iron industries can be said to have entered upon a new chapter of their existence. Several great trusts are in course of construction, the guiding principle of which is to bring together the production of raw materials, half-finished steel, and the most highly finished products under control of a single general management, or of companies having common directors and pursuing a harmoniously centralized business policy.

## Steel and Electrical Combine

The annexation of the Bochumer Co. by the Rhein-Elbe Union (Deutsch-Luxemburg and Gelsenkirchener) was mentioned in my letter of four weeks ago. That deal meanwhile has been put through, and leading directors of Rhein-Elbe have been elected to the board of Bochumer. This operation is hardly off the boards before it is followed by a still greater transaction: a close community-of-interest arrangement between Rhein-Elbe and the Siemens-Schuckert Electrical Co. of Berlin, which was announced several days ago. This new combination, with a capital of more than 500 million marks and several hundred millions more in bonds, becomes the strongest in Germany's business world. It is assumed that the participating companies will have each the same capital and that profits will be pooled, and thus the same dividend be declared for each company—upon the model of Germany's great chemical trust. The capital of Deutsch-Luxemburg and Gelsenkirchener is 130,000,000 marks for each. That of Siemens-Halske—one member of the Siemens-Schuckert concern—is 126,000,000 marks, after having been doubled only last May; while that of the Schuckert Co. is 70,000,000 marks, which is also the amount of Bochumer's capital. The Schuckert Co. has its main works at Nuremberg, and it is interested in various Bavarian undertakings.

Another great operation announced last week was the annexation of the Hasper Eisen und Stahlwerk by the Lothringer Hütten und Bergwerks-Verein. At the same time the Lothringer company announced a community-of-interest with the Koenigsborn Coal Co. for a period of 24 years, with provisions for a complete consolidation within that time. The Lothringer Co., as its name indicates, was a Lorraine concern (formerly Aumetz-Friede); but it was dispossessed there through the transfer of Lorraine to France. Since then it has moved into the Westphalian district, where it has large coal interests, besides having close alliances with several iron and steel companies. It has for some time had a community-of-interest arrangement with the Façoneisenwalzwerk Mannstädt, with the Duesseldorfer Eisen und Drahtindustrie, and this year it formed a fusion with the Geisweider Eisenwerke, the principal steel producer of the Siegerland district.

## A Machinery Consolidation

Still other important consolidations have just been made by the Gutehoffnungs-Hütte of Oberhausen on the Rhine, which is the property of the Haniel family. After having quite recently annexed the Esslinger Maschinen-Fabrik in Wurttemberg, it has now acquired a controlling interest in the famous Maschinen-Fabrik Augsburg-Nürnberg, which is the foremost machine building establishment of Germany. It is especially

known for its big gas engines and more recently for its Diesel motors. It is a great consumer of iron and steel, taking more than 100,000 tons yearly. It has increased its capital twice this year, raising it finally to 100,000,000 marks. It is mentioned as evidence of the sharp rivalry now prevailing among the great iron and coal companies in acquiring new connections that Hugo Stinnes, the ruling spirit of the Rhein-Elbe Union, made an attempt to get control of the Augsburg-Nuremberg machine shops, but he was defeated by the Haniels. The Gutehoffnungs-Hütte has been for some years owner of the majority of the stock of the Deutsche Werft, a shipbuilding establishment at Hamburg, in which the Hamburg-America Line also owns an interest.

In addition to the operations mentioned above, it is reported that the Rhein-Elbe Union has bought up a part of the stock of the Gebrüder-Böhler Co., which manufactures high quality steel, but it did not succeed in getting a majority interest. This effort led to a movement to organize a group of producers of high grade steel, which will include Gebrüder Böhler, Krupp, Gelsenkirchener Gussstahl and Eisenwerke (not to be mistaken for the great Gelsenkirchener Bergwerk's Gesellschaft), and the Dortmunder Union, which some years ago was annexed by the Deutsch-Luxemburg Co. These concerns produce electric steel and various alloys.

The Stumm concern is also still throwing out new lines. It has recently acquired a part of the stock of Eisenindustrie in Menden and Schwerte, also a considerable block of the stock of the Annener Gussstahlwerke. It has also bought control of the car shop Gebrüder Schöndorff in Düsseldorf and intends to annex it to the Gelsenkirchener Gussstahl concern, which it acquired several months ago. Just now it has also made a community-of-interest arrangement between the Essen coal mine König Wilhelm and the Minister Achenbach mine, already owned by the Stumms. They are also rapidly developing the Gelsenkirchener Gussstahl plant.

## Coal More Plentiful

The movement of coal in the Ruhr district has latterly become somewhat lighter, owing to the heavy demand for cars for moving the crops and the low water level in the Rhine. The daily rail movement has fallen off about 750 carloads. Production there increased about 300,000 tons in October. For nine months to the end of September, the production for all Germany was 95,736,000 tons and also 81,192,000 tons of brown coal. This means about 11,000,000 tons more of coal and 12,600,000 tons of brown coal than for the same time in 1919.

At the annual meeting of the Hasper Co. last week, Peter Klöckner drew attention to the world-wide coal famine and said that German companies were compelled to import American coal at six-fold the price of German coal, in order to keep their works in a position to export their products; but he expressed the opinion that this state of things cannot endure for long.

"Two countries of Europe," he added, "are already approaching a position, where, owing to the peace treaty, they will have a surplus of coal—namely, France and Belgium. The French and Belgian trades have made a sharp reduction of iron prices in consequence of the reduction in coal and coke prices allowed by the state. This was designed not only to increase the Belgian and French consumption of iron and steel but to increase exporting capacity. French and Belgian competition is making itself strongly felt. The trade of those countries is trying to capture orders and to drive German business from the markets. Germany's coal



consumption therefore will soon undergo a big decrease, and the army of unemployed will swell proportionately."

#### Hardware Trades Hard Hit

In line with these remarks it is reported that in the hardware shop of Remscheid 2000 to 3000 workmen are compelled through coal scarcity to be idle one to three days a week, and the situation is growing rather worse than better. Similar conditions prevail in the Solingen cutlery trade. It is expected that some of the shops will have to shut down completely at an early date.

The position of the hardware trade has grown worse within a month. Besides the lack of coal just mentioned, not a few of the shops have had difficulty in supplying themselves with steel, but an improvement in that respect has taken place. Builders' hardware finds few buyers, and large stocks have accumulated at the shops; but locks are bought in good quantities for export. The demand for tools is also very light. Hardware prices were reduced at the beginning of the month, corresponding with the recent reduction of steel prices.

The Government has now adopted a scale of maximum prices for iron and steel. They correspond to the new prices quoted in my last report—which means that the Government has accepted the list adopted by the Iron Industry Union.

News regarding the state of business in the trade has been very scarce for the past fortnight. From the Silesian district a further weakening of old material is reported, and supplies have somewhat increased. The Siegerland Ore Association has reduced roasted sparry ores further by 5 marks to 406.50 marks. The wire convention has announced a new scale of prices on the various classes of goods, with an all-round cut of 45 marks per metric cwt.

The Gutehoffnungs-Hütte has secured the contract for constructing the entire plant of the Netherlands Steel Works and Blast Furnace Co. It is expected that the first furnace will be blown in during the course of next year.

The Mannesmann Röhren-Werke, the greatest tube manufacturing company of Germany, reports for the past year gross profits of 104,000,000 marks, as against 25,700,000 marks for the previous year. After carrying 25,800,000 marks to reserves and paying the like amount in taxes, a dividend of 20 per cent was paid, as against 6 per cent for last year. From the sale of 60 per cent of its branch establishment on the Saar to French capitalists and stocks of goods there, the company will receive a sum considerably greater than its capital, which is 86,000,000 marks; and with this money, it will enlarge its producing capacity.

#### Expansion of Australia's Leading Steel Company

The Broken Hill Proprietary Co. of Australia announces that large additions to the plant will be made during the next two years, says the Engineering Supplement of the *London Times*. The company has acquired substantial deposits of iron ore in South Australia. Those previously held are estimated to contain millions of tons assaying from 66 to 68 per cent of metallic iron, and the newly acquired deposits are reported to be equally rich. The following table shows the output from the works at Newcastle during the last three years:

	1918 Tons	1919 Tons	1920 Tons
Pig iron .....	109,154	155,172	171,139
Steel ingots .....	141,889	178,002	166,712
Coke, etc. ....	109,069	174,040	170,970
Sulphate of ammonia....	1,718	2,630	2,618
	Gal.	Gal.	Gal.
Tar .....	1,123,235	1,673,480	1,913,358

The additions to the works at Newcastle include 129 new coke ovens. Of these 63 are in course of erection and a start will be made shortly with the remaining 66. The two batteries of coke ovens at present in use consist of 161 ovens, and with the completion of the new series there will be nearly 300 in commission. The works will require about 2250 tons of coal a day, and not only will the output of coke be increased, but

there will be a large expansion of the output of gas, tar and sulphate of ammonia. The additional coke ovens alone will require 6300 tons of coal a week—the output of a fair-sized coal mine. In 18 months' time the works will consume coal at the rate of 1,500,000 tons per annum. The installation of the additional by-product ovens will entail an expenditure of about £250,000.

The building of the new blast furnace is being pushed ahead, and it is expected to be in operation shortly. At present about 4500 men are employed on the works, and the management estimates that this number will be nearly doubled by the beginning of 1922. The whole of the material for the blast furnace is being made in Australia, including the plates.

In addition to the extensions to the production plant an immense steel frame building equipped with electric traveling cranes is being erected for storing the products of the merchant mills. Other additions are also being made, and the works in the course of time will be among the largest in the world. During the year ended May 31 £377,614 was expended on the works. For the same period the company's profits amounted to £517,663, as compared with £652,342 in 1918-19. The shrinkage is due to the cessation of production at Broken Hill caused by the miners' strike.

#### French Standardization Commission for Steel and Other Specifications

Since the war the French have shown great energy in regard to the standardization of specifications governing the quality of material. A Permanent Commission on Standardization was organized by the government on June 10, 1918. Once established the commission appointed sub-commissions, 14 altogether, for the special products and industries. The conclusions of each sub-commission, after being examined, are subject to a public hearing, and after this are adopted as official standards.

Nineteen standards on which much work has been done were adopted Dec. 23, 1919. In Jan. 1920, the Minister of Commerce and Industry made them obligatory in the work of his department. The Minister of the Navy recently made the same ruling and was followed by the Minister of Public Works. Other ministers and departments are studying the specifications already adopted. June 4, 1920, the permanent commission officially adopted 13 new standards, seven of them dealing with iron and steel, as follows:

A1-1.—Collection of mechanical methods of testing for metallurgical products.

A1-2.—Unification of the nomenclature of metallurgical products (iron and steel).

A2-1.—Specifications for bars, blooms, billets and slabs of carbon steel other than tool steels (ordinary stock products).

A2-2.—Specifications for bars of carbon steel other than tool steels (products shipped after definite treatment).

A2-3.—Specifications for bars, blooms, billets and slabs of carbon steel other than tool steels (products to be submitted to definite heat treatment after shipment).

A2-4.—Specifications for bars, blooms, billets and slabs of steel low in carbon for case-hardening.

A2-5.—Specifications for bars, blooms, billets and slabs of carbon steel not capable of being hardened on quenching.

Additional public hearings were scheduled June 15 to Aug. 15 on 24 proposed standards dealing chiefly with aluminum, wood and alloys.

It is felt by the technical men of France that this Permanent Commission on Standardization has shown by the work already accomplished that it will take a real part in the rebuilding of the country and its industrial rebirth.

G. B. W.

As a result of operations of its No. 2 blast furnace, which was recently remodeled, the LaBelle Iron Works, Steubenville, Ohio, has commissioned Arthur G. McKee & Co., Cleveland, to redesign the furnace top structure of its No. 1 furnace. McKee & Co. will also furnish the materials required in the reconstruction of the furnace top.

# President Campbell, Youngstown Sheet & Tube Co.

A Tribute to One of the Leading Steel Company  
Presidents—Remarkable Growth in Twenty Years

—BY CHESTER A. DICKHAUT—

THE twentieth anniversary of the Youngstown Sheet & Tube Co., which was organized Nov. 28, 1900, serves to call attention to the remarkable growth of that corporation, which is one of the largest producers of iron and steel in the United States and stands second among the independent companies in the diversity of its product. Practically all of this growth has been achieved under the executive direction of James A. Campbell, whose portrait, made from a painting for which he sat after much urging by his life-long friend, Joseph G. Butler, Jr., is reproduced on this page.

The Youngstown Sheet & Tube Co. was founded on an extremely modest scale, its original capital being only \$600,000. Its first president was George D. Wick, one of the organizers of the Ohio Steel Co., and a man of large experience. James A. Campbell, who had been district manager for the Republic Iron & Steel Co. and had originated the new concern, was vice-president and general manager. Before the erection of a plant was begun, the plans were enlarged and the capital was increased a number of times during the progress of construction, so that when operations began it was \$4,000,000. More than the average share of difficulties was encountered and, in May, 1902, failing health forced Mr. Wick to resign, leaving the enterprise with many unsolved problems and no executive head. Mr. Campbell remained in charge for more than two years as vice-president, while the directors sought for a president with the ability and experience deemed necessary. Before such a man was found, or at least before anyone satisfactory could be induced to accept the responsibility, it became evident that the vice-president was himself the man needed for the job. In July, 1904, he was elected president and has filled the position continuously since that time. This circumstance indicates what those who know him generally regard as Mr. Campbell's chief characteristics—his inherent ability and his exceeding modesty. They are also familiar with his integrity of thought and action, demanding that every proposition shall square absolutely with fact, and his conservatism and extreme caution in business matters.

There is a side to his character, however, not less interesting but known to a much more limited circle. To his intimate friends Mr. Campbell is not thought of so much as a capable executive, but as a man of cultured mind and magnetic character, warm sympathies and strong convictions. He seems to be one of the comparatively rare men able to absolutely subordinate personal inclinations to sound judgment on every occasion where clear thinking is essential to wise decision. Few people who have known him only in a business way have any idea of the natural gentleness of his disposition or the generosity of his nature. The keenness with which he enjoys the gratification of kindly impulses, where indulgence of these is not foolish or merely sentimental, is evidence of a natural disposition not often associated in the public mind with unusual executive ability.

Mr. Campbell is not a college man, except in the sense that he attended college for a time and made such

a record that he was offered an appointment to West Point Military Academy. He is, however, thoroughly educated and appreciates both literature and art having genuine merit. He is a great reader, and few men are so well posted on current affairs or can think so well in international terms. Not many men can write more forceful Anglo-Saxon, or say in fewer words exactly what they mean.

Probably the least generally understood of all Mr. Campbell's characteristics is his attitude toward men who work with their hands. On the rare occasions when it was impossible for him to avoid war with unions he fought them with such determination and success that their leaders generally regard him as uncompromising and arbitrary on this question. But in his relations with the employees of his company he has been at all times scrupulously just and frequently very generous. The real welfare and happiness of the 15,000 men in his organization are constantly in his thoughts, and few corporations have gone further in a genuine effort to better working conditions than his. Among people connected with his company in such a way that it is possible for them to know him personally he is regarded with universal affection, and he mingles with them in a spirit of friendliness and simplicity rather unusual under similar circumstances. There is probably nothing he misses more with the growth of his company than his former association with the men in the mills, all of whom he at one time personally knew and most of whom he called by their Christian names. In his home city he is expected to lead every large movement for community bene-

fit and has done so for years. During the war he devoted much time to public service, acting as chairman of the institute's committee on tubular products, as well as serving in many National, State and local war-work organizations.

When asked to name the principal cause of the success that has attended his company, Mr. Campbell's reply was characteristic: "I happened to have able and loyal men to advise me and the ability or luck to pick good men for our organization." His attitude toward all of his associates reflects the honesty of this opinion, and it has probably not a little to do with the efficiency, harmony and absolute loyalty so conspicuous in the Sheet and Tube organization.

Mr. Campbell is 64, but his health and energy are those of a man of 50. He spends much time in New York on business and takes an annual vacation of several weeks at Hot Springs, where he likes the climate and the golf course. Except for these absences, he can be found almost any day at his office, and almost any evening at his home, a handsome but not pretentious place on Logan Road, marked by extensive and well-kept grounds and a simple and sincere hospitality.

## The Business Outlook

President Campbell has addressed a statement on "The Business Outlook" to employees of the company and its subsidiaries, in part as follows:

"The outlook for business is not as promising as it has been. There is less disposition on the part of the



\*Youngstown correspondent THE IRON AGE.



public to go on with improvements and building operations of one kind or another on the high basis obtaining for materials and labor and the high cost of money even where it is possible to secure loans at any rate of interest.

"People generally seem to believe that lower values will prevail in the near future, and for this reason there has been a recession of buying in all lines.

"It is probable that some of our departments will not continue to operate on full time, but at the same time the cost of living, we believe, will soon be considerably reduced. Woolen goods are already off over 25 per cent. Cotton textiles have been reduced over 33 per cent. Flour, potatoes and the cereals are all lower in price. There is a great opportunity for those of our employees who have steady work to save if they take advantage of these conditions. Everyone should see that his money goes as far as possible and seek those merchants who have made reductions to correspond with any reduction in prices they have now to pay for their stocks.

"It is not likely that any general reduction in wages will come about for some time, but it will surely come later on—not, however, until the cost of living has been further reduced. In the meantime the workman who has steady employment should earn all he can and save his money by putting off buying as far as possible until a later date, when he will be able to get more for his dollar. I mean by this that anyone who can get along

for a month or two without buying anything regarded as a necessity, can probably buy such articles later to considerable advantage. Those who have been thinking of buying or building a home may find it profitable to wait until spring, as there is every indication that building costs are going to be lower. Lumber has been recently greatly reduced and undoubtedly reductions in other building materials will follow.

"What is needed more than anything else is economy, and if this were practised by every man, woman and child in this country for six months or a year, money would be cheap, business would resume at a normal rate and everyone would have much more assurance concerning the future than they have at present.

"Prices of steel products are considerably lower to-day than they were thirty days ago, so that the margin of profit in our operations is now very small. We are hoping, however, for lower prices on coal, which has been unreasonably high. This would be of some help, but present costs of ore, limestone and freights will not change much over the next six or eight months, and during this time we shall be operating on a very close margin, and probably not to full capacity.

"In view of these facts, my advice to our employees is to work every day they have an opportunity and to save as much money as they can. By doing this they will be in much better position should conditions be such as to prevent us from operating all departments steadily during the winter."

## PEOPLE OF EUROPE PROSPEROUS

### President of International Steel Corporation Finds Belgium Working—Italian Radicalism

"The traveler in Europe is chiefly impressed with the evidence that these countries are much more prosperous than we have been led to believe from reports," says Morris Metcalf, president International Steel Corporation, 51 Chambers Street, New York, who returned Nov. 24 from a European business trip. Mr. Metcalf's trip included England, Belgium, France and Italy and he found that while the governments of these countries were not financially strong, the people everywhere were enjoying good incomes and sufficient food.

Mr. Metcalf's impression of radical agitation in Italy was that it is too much of the comic opera variety to be of a very serious nature. The Italian temperament, he points out, is never satisfied unless it is agitating for or against something and in many ways the communists have been justified in their demands for a greater voice of labor in industry. Italy is buying a great deal of iron and steel in Germany, where before the war manufacturers traded with complete satisfaction to both parties. The Germans have a reputation among the Italians of living up to contracts, delivering what is promised and offering good credits. American traders, however, not only in Italy but almost universally throughout Europe, do not enjoy a good reputation for fair business. This feeling was undoubtedly increased during the war, when Europe was forced to trade largely with the United States and many small exporters who adopted questionable business ethics appeared.

Reputable American companies now suffer in the estimation of the European buyers through the activities of the dishonest spectators of the war period.

"The Germans have good-sized stocks and a large productive capacity for steel used in war materials," says Mr. Metcalf, "and are unquestionably anxious to unload." They seem particularly well supplied with high carbon steels and all kinds of billets. Judging by the prices that are quoted, the cost of production does not always enter into consideration. A buyer willing to purchase in dollars or the pound sterling can almost invariably make his own price.

Belgium, of all the European countries, says Mr. Metcalf, is evidently working the best and progressing toward real prosperity with the greatest speed. France

is slowly beginning to realize that she can hope for but little of what was expected from the German indemnity. While all the countries are at present feeling the world-wide depression, Germany and Belgium, through the low exchange rates, are still transacting considerable business. For the present, there is little or no business for the American exporter to Europe. Buyers are in the market for immediate necessities only and many of these small orders are being booked by Germany at low prices.

### Brown & Sharpe War Memorial

A war memorial, in the form of a booklet of nearly 100 pages, to the 911 employees of the Brown & Sharpe Mfg. Co., Providence, R. I., who served in the World War is issued. The booklet contains photographs of the men who lost their lives in service, together with an account of their war record, and has been distributed free to the families of the men who were killed, to the men who were in the employ of the company when they entered service and to several thousand employees who were at the factory during the war. The book also contains a note of appreciation from Henry D. Sharpe, treasurer, extolling the patriotism of the company's employees. A part of the book is devoted to the service of the employees of the plant who aided in mechanical production and subscribed liberally to all campaigns. Figures given show that employees subscribed to \$1,400,750 Government loans and invested more than \$164,000 in war savings stamps.

The Charles R. Hilb Metals & Smelting Co., Cincinnati, has been incorporated with a capitalization of \$100,000, and will engage in a general smelting and refining of non-ferrous metals. Negotiations for a plant for the company have not been completed. C. R. Hilb, for the past five years secretary and general manager of the Hilb Smelting & Refining Co., is the president of the new company, and Bell E. Smith secretary.

The Milwaukee Rolling Mill Co. has practically completed a sheet mill on a 25-acre tract on Greenfield Avenue, Milwaukee, Wis., and expects to commence operations by Dec. 15. Approximately 1000 men will be employed and the product, it is understood, will be used by the Milwaukee Corrugating Co. The buildings and equipment represent an outlay of \$2,000,000.



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# THE IRON AGE

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## Readjustment in Steel

Iron and steel manufacturers of the United States have never faced a readjustment so complicated as that with which they must now deal. No previous depression in the American steel industry was accompanied by world-wide disturbance, and in many countries practically national bankruptcy. No previous depression in our steel industry has come when other domestic industries were passing through such drastic reductions in prices as have already taken place or are now in progress. Often, in the prince-and-pauper alternations which readily can be recalled by those who have been 30 years in the trade, iron and steel values in the United States have swung from high to low, with no important accompanying changes in prices of food and clothing, in fuel, rents or other of the components of the cost of living. Today all domestic prices are under readjustment and all the charts that have been looked to as pointing the way back to normal are of little or no use. Added to all the complexity of the problems with which he now must deal in his own business, the manufacturer of iron and steel realizes that an important new factor must be dealt with in the large contribution foreign buyers have made to our prosperity in the two years since the armistice. That foreign contribution is now falling off rapidly.

Another feature of the present readjustment in steel which has never been duplicated is the situation growing out of the wide variation between Steel Corporation prices and those of independent steel producers in the past fifteen months, and particularly accented in the ten months beginning with February of this year. In gross, several hundred million dollars more has been paid to independent steel producers for their half of the country's steel output since the prices of March 21, 1919, became effective than the Steel Corporation received for its output. But to-day the Steel Corporation has roundly 9,000,000 tons of unfilled orders on its books, while the total on the books of independent manufacturers is only a fraction of that amount. Such a situation is in sharp contrast with that which existed thirteen years ago, for example, when the Steel Corpora-

tion and the independents, on practically the same footing in respect to order books, faced the vicissitudes that followed the panic of 1907. Judicial and legislative barriers built in the intervening years make any repetition of the Gary movement of that period utterly impossible.

Time is to be no small factor in the working out of such a situation as the steel trade now faces. So far as the solution of their own price problem is concerned, independent steel manufacturers will be helped materially by the existence of the price schedule of the Steel Corporation, which now becomes in a sense a standard which the corporation itself will have a large stake in maintaining. The possibility of independent producers selling below the Industrial Board basis of March 21 has been referred to in some published comment on the steel market; but it is well known that at present costs not a few producers would find profits seriously jeopardized by such a policy. Wage reductions are naturally suggested, but that road will be entered upon with reluctance. Any such readjustment will hardly come until serious unemployment has developed. Moreover, the reductions in wholesale prices of the common commodities of life are very slow in reaching the markets in which the individual buys.

The prompt adjustment of production to demand is one stabilizing factor in the situation that has been particularly in evidence in pig iron. It is easily possible, in the effort of buyers all along the line to have on hand no excess of high priced steel, for consumption to continue on a basis which in due time would appear to be out of proportion to the curtailed production. That might cause a rebound, and the possibility of such a rebound has already had a place in current prophecy as to the course of the market in the next few months. But such movements must be thought of as but passing phases of the larger readjustment now under way in iron and steel, that only started after other industries, in which prices had soared farther, were some distance along in the process of deflation.

It is widely telegraphed that a world inquiry into industrial production in its relation to cost of living and wages is to be undertaken by the

International Labor Conference created by the Treaty of Versailles. The labor office at Geneva gives out the opinion that "the material will be useful in proving or disproving the claim of worldwide decline in the productivity of labor." We are not sanguine that the expectations entertained in regard to the results of such an inquiry will be realized. Industrial conditions throughout the world are in such a state of flux that what an investigator finds to-day will be quite out of date by the time his information and that of other investigators have been distributed. Rates of exchange and the balance between exports and imports are fluctuating constantly, as are wages and cost of living. Those who are to carry on the inquiry of the labor office might well postpone their work until stabilizing influences have begun to show some results. Two years have passed since the armistice and there is scarcely a beginning of stabilization.

### The Place of the Industrial Engineer

Industrial engineering has not had general acceptance as a major profession. Mechanical engineering, so largely concerned with the industries, has included among other groups that which has specialized in management. It is natural, in view of the number of mechanical engineers in charge of manufacturing operations, that the existing organizations of such engineers should take into their field questions having to do with the handling of labor. However, along with the development of scientific management has come the claim that human relations in industry are susceptible of analysis and of reduction to a scientific basis and therefore constitute a separate department of engineering.

To-day, in view of the number of men who have entered this field, there is a demand for college training in industrial engineering. It is urged that the traditional engineering courses do not provide for the increasing call for technical school men to enter factory organizations. The principles of management are already highly developed and employers are less and less willing to have their plants operated as post-graduate laboratories.

There is nothing new in urging special courses of study on our institutions of learning. They have tried always to meet reasonable demands in this direction so far as they did not interfere with broad grounding in fundamentals. There is no need to marshal the reasons why generally our colleges should oppose the solicitations that come from various quarters to take up specialties. The value of breadth of education is well recognized, and the fact that some engineering schools are already offering courses in industrial education does not of itself prove that it would be wise for others to follow. But account does need to be taken of the increasing demand for engineers in factory administration and of the much greater body of facts that must be mastered to-day by those who look forward to a career in management. If numbers count and if industrial relations come properly in the scope of engineering,

then, as the recent Pittsburgh meeting of the Society of Industrial Engineers went far to prove, industrial engineering is well on its way to a place as a major profession.

### Open Shop and the Building Trades

Particular attention should be directed to the fact that while the open shop movement in general is making substantial progress the building trades furnish an exception. Such an exception is a very important one. In no class of industrial activity is the public as a whole more interested.

The open shop movement is a spontaneous one, not the result of any "conspiracy," as Mr. Gompers charges. It represents in large part a reaction produced by the overbearing manner of the trade unionists when war conditions and the attitude of official Washington gave them the upper hand. This must not be regarded as a reaction merely of employers. Recent experiences, particularly of the past year, showed non-union workers that they, as well as employers, were being exploited by the unions. There has been some loose talking as to the result of the last national election. Mr. Gompers had undertaken to deliver "the labor vote" to one of the presidential candidates. If this was what Mr. Gompers attempted it is obvious that he failed, but the strict construction was that Mr. Gompers undertook to deliver the vote of union labor. In this he may have had some success. Who knows? About 10 per cent of the workers are union and about 90 per cent are non-union or open shop. Mr. Gompers could easily have delivered a large part of the 10 per cent without the election returns disclosing the contribution.

Pittsburgh is quite an open shop town, with the two notable exceptions of the building trades and the trolley lines. Not only is the work of building in Pittsburgh in the grasp of the unions, with their high wages and limited performance, but the community is very short of artisans. The two principal causes assigned for the shortage are the high initiation fees charged by the local unions and the shortage of houses. Pittsburgh, in other words, cannot build houses because there are no houses for the workmen to live in while the houses are being built.

Community spirit once aroused would be a strong force toward righting matters in the building trades and relieving a situation in which it costs three times as much to build as before the war and more than twice as much as existing buildings are worth, on an average, in the real estate market. The community should be particularly interested. When an open shop industry exists in a community the average citizen has little interest. Its product may be distributed chiefly outside the community, or even exported. Money is brought to the community but the influx of money may injure the ordinary citizen by increasing his cost of living. Almost every citizen in the community, on the other hand, would be benefited by a decrease in the cost of building. The house owner wants repairs made and has no



objection to a change whereby his neighbor can build a house more cheaply. His neighbor is not a competitor. The renter cannot object to a change that is likely to bring down rents. All employers are interested in seeing housing conditions improved, as are all retail shopkeepers. The open shop in the building trades should appeal to the community more strongly than the open shop in anything else. Perhaps communities will soon begin to see the matter in this light, and if a good start is once made competition and rivalry between communities will do the rest and the country will then be able to build as it is entitled to do.

### Blast Furnace Raw Materials

It is noteworthy that the consumption of iron ore by blast furnaces, per ton of pig iron made, has decreased in the past ten years. Seeing that the iron ore shipped from the Lake Superior region has been growing leaner more or less regularly year by year, one would expect the opposite trend in the consumption as a whole. From the table given in the annual statistical report of the American Iron and Steel Institute the following comparison is drawn:

<i>Tons of Material Per Ton of Pig Iron Made</i>		
	1909	1919
Ore, briquettes, etc.....	1.886	1.813
Scrap, cinder, scale, etc.....	0.098	0.133
Total .....	1.984	1.946

It is true, of course, that the scrap, cinder and scale have higher metallic contents than the ore, and the increase in the use of the former would tend to increase, but only slightly, the total amount of iron bearing material charged. Another influence is that the proportion of iron made in the regions where low grade ores are used has decreased somewhat in the ten years. After all allowances are made, however, there is room for a belief that practice has improved, so that less iron is carried off by the blast and by the slag.

Statistics of coke consumption by blast furnaces cover only the last eight years. The coke consumption by the coke furnaces (setting aside the coke and anthracite furnaces) was 2252 pounds per ton of iron in 1915, the lowest record shown, while there was an increase to 2375 pounds in 1918, and 1919 showed 2310 pounds. Undoubtedly all blast furnace men will attribute this increase to deterioration in the quality of the coke. The statistics of ore consumption prove quite conclusively that it was not due to the character of the ore smelted.

The fuel consumption by the coke furnaces sinks almost into insignificance by comparison with the fuel consumption of the furnaces using mixed coke and anthracite. In 1918 this last class of furnaces averaged, per ton of pig iron, 2921.8 pounds of coke plus 496.1 pounds of anthracite, or 3317.9 pounds altogether. In 1919 these furnaces effected a great saving, using only 2307.2 pounds of coke and 414.6 pounds of anthracite, a total of 2721.8 pounds, but even that was bad enough.

The total weight of ore, scrap, etc., fuel and limestone consumed by blast furnaces in 1919 was

about 107,000,000 gross tons, employed in the production of 31,015,364 tons of pig iron. Thus the blast furnaces assembled on an average 3.45 gross tons of material per ton of pig iron made, apart from brick and supplies. In addition they usually have to pay the railroads for slag wasting, and accordingly it may be said that as a general rule the freight on four gross tons of material enters into the cost of making one ton of pig iron. Thus the heavy freight rate advances in June, 1918, and August, 1920, constitute a large barrier against a return of pig iron prices to the pre-war level. That is one item that the blast furnaceman cannot attempt to reduce in these times of cost paring.

### Germany and Copper

Rather unexpected is the statement of a German authority in THE IRON AGE of Nov. 11, to the effect that "the war in general and submarine warfare in particular have demonstrated the fact that modern steel casting technics have now reached a pitch of perfection which robs brass of much of its boasted superiority" and "that for purely economic reasons alone Germany will have to curtail her consumption of copper to a minimum during the next decade."

The fact that German steel foundries have so perfected their products that these can be used in place of brass is perhaps not so surprising when it is remembered that Germany before the war had a reputation for superior work. The matter is of unusual interest not only to American foundrymen, who of course would like to do equally well, but also to copper exporters. If steel castings can be so made as generally to supplant brass, the German consumption of copper will be cut down. This fact, together with the economic reasons mentioned, will tend to limit Germany's use of copper which before the war was not far from one-half the American output.

In this connection the present trend of our copper exports is of interest. For the nine months to Oct. 1, this year, the refined copper shipped abroad amounted to 460,240,772 pounds, or in excess of the total for all of 1919, which was 438,160,818 pounds. Of the exports this year Germany has taken 68,847,613 pounds and risen to the fourth in rank among foreign consumers of copper, France, Japan and the United Kingdom standing in the order named. Thus far this year Germany has taken 15 per cent of the total exports, against none in 1919 and 33 per cent in 1913 when the Central powers were laying in stocks for the war. In view of economic conditions in Germany, the country's copper purchases this year are remarkable. It would seem that Germany's needs have not begun to be filled and that her buying of copper may continue to be considerable.

The Mechanical Equipment Sales Co., 821 M. & M. Bank Building, Milwaukee, incorporated a few months ago with capital stock of \$25,000 will sell all kinds of mechanical equipment, boiler room machinery a specialty. The incorporators are Hans Birkholz, Sr., president; Richard G. Birkholz, vice-president and Charles H. Cross, secretary and treasurer.

## CORRESPONDENCE

### Titanium as a Deoxidizer in Basic Open-Hearth Steel

*To the Editor:* In discussing the deoxidizers used in basic open-hearth steel, F. S. Toy, on page 1195 of *THE IRON AGE*, Nov. 4, makes several statements which the Titanium Alloy Mfg. Co. has been emphasizing in connection with its product for several years. One of these concerns the use of silicon or aluminum in the molds, which Mr. Toy mentions as a practice which is being eliminated. This is a step which unquestionably would tend toward the production of cleaner steel, as the deoxidization products or slags do not have time to separate as thoroughly from the metal in the molds as in the ladle. In the treatment of steel with titanium, we have always specified that this alloy should be the last addition to the steel, and that it should be added in the ladle.

The need which Mr. Toy mentions "for deoxidizers whose products of oxidation are easily fusible at pouring temperatures so that they will unite and rise to the top of the ingot" is largely filled by ferro carbon-titanium in connection with the usual ferromanganese and ferrosilicon. Some interesting data on the effect of titanium oxide on manganese-oxide-silica slags are given by J. R. Cain in *Chemical and Metallurgical Engineering*, Nov. 3, 1920, page 879. Mr. Cain's figures show plainly that titanium oxide is fluxed easier or at lower temperatures by manganese oxide than either silica or aluminum are. Furthermore in mixtures of silica and manganese oxide such as are usually encountered in non-metallic inclusions in steel according to Hibbard's analyses (the proportion being about 25 per cent silica to 75 per cent manganese oxide), additions of titanium oxide were found to lower the melting point from 80 to 120 deg. C. Also in mixtures with 15 per cent or 25 per cent silica, the balance being manganese and titanium oxides in various proportions, the mixtures of highest fusing points were those without titanium, the addition of whose oxide in various amounts lowered the fusing points on an average about 100 deg. C. In view of these results found by the National Research Council and the United States Bureau of Standards, it seems rather unfortunate that Mr. Toy failed to increase the completeness of his paper by mentioning the fact that titanium, which is now used so largely as a final deoxidizer for basic open-hearth steel, actually accomplishes, to at least a noteworthy extent, the ease of fusibility, which he considers so necessary a property of the oxidation products of the deoxidizers used for steel.

G. F. COMSTOCK,

Metallurgist, Titanium Alloy Mfg. Co.

Niagara Falls, N. Y., Nov. 27.

### To Develop Manufacturing Center

The Nashville Industrial Corporation, composed of business men of Nashville, Tenn., has purchased from the United States Government the Old Hickory powder plant at Jacksonville, Tenn., 12 miles east of Nashville, on the navigable Cumberland River. The plan is to industrially develop this property into a large manufacturing center, having available large housing and manufacturing buildings and facilities. The village had a population of 35,000 when the plant was closed in 1918, and is now completely equipped with all necessary public utilities, schools, banks, clubhouses, etc. This was the largest Government manufacturing undertaking during the war, costing over \$87,000,000. A great quantity of surplus material in the manufacturing area will be dismantled and sold.

The late Daniel M. Wright was not president of the Universal Chain Co., Stroudsburg, Pa., as stated in *THE IRON AGE* of Nov. 4. Charles Robertson is president and general manager of that company.

## JOBBER MEET IN BOSTON

### Conference of American Iron, Steel and Heavy Hardware Association Executives

The semi-annual meeting of the executive board of the American Iron, Steel and Heavy Hardware Association was held last week in Boston by invitation of the New England members. The following were in attendance:

President Eugene J. McCarthy, Beals, McCarthy & Rogers, Buffalo; First Vice-President Andrew Wheeler, Morris, Wheeler & Co., Philadelphia; Second Vice-President William L. Niekamp, Beck & Corbitt Iron Co., St. Louis; Secretary-Treasurer A. H. Chamberlain, New York; J. B. Carse, Ogden & Wallace, New York; C. W. Henderson, Jr., Arthur C. Harvey Co., Boston; A. J. Lockwood, Edgar T. Ward's Sons Co., New York; C. R. Williams, Williams Hardware Co., Minneapolis.

Advisory board composed of former presidents: E. P. Sanderson, E. P. Sanderson Co., Boston; C. M. Roehm, Roehm & Davison, Detroit; Henry Bodevin, N. Langler & Sons, Brooklyn, N. Y.; F. H. Butts, Butts & Ordway Co., Boston; S. L. Orr, Orr Iron Co., Evansville, Ind.

Coming at this time of reaction, the meeting was of great importance and the discussion covered matters of unusual interest. The visitors were entertained by the New England members, who gave them a dinner at the Algonquin Club at which about 125 representatives of the New England trade were present. F. H. Butts presided at the dinner and E. P. Sanderson acted as toastmaster. Among the speakers, in addition to the officers of the association, were Professor Bullock of the

### The Iron Age and Its Readers

A letter of appreciation came recently from a new steam truck manufacturing company, following the publication of an item on its incorporation. *THE IRON AGE* is "not new to the writer," the letter went on to say. "Whether in North or South America, Europe or Asia, *THE IRON AGE* receives the same reverence in a machine shop, foundry, rolling mill or laboratory that Webster's dictionary receives in the universities of the nation. *THE IRON AGE* is the primer, also an advanced text of the world's industrial progress."

A few days ago the freight traffic agent of one of the transcontinental railroads was overheard saying: "For a number of years I was purchasing agent for the — Lines and practically everything we bought in the metal line was on three months' contract based on *IRON AGE* quotations." Some of these contracts were for commercial products composed only partly of material quoted in *THE IRON AGE*, and in these cases also its quotations were used as a base.

Department of Economic Research, Harvard University, and George W. Denyven of Boston. Andrew Wheeler, who had just returned from abroad, gave an interesting account of his trip and conditions observed in several countries on the other side. During their stay in Boston the visitors inspected the new Allston warehouse of Arthur C. Harvey Co.

The Boston Chapter, American Society for Steel Treating, held a trouble meeting at the Engineers' Club Nov. 15, at which several questions asked by members were satisfactorily answered. The meeting was well attended. An effort is to be made to increase the membership of the chapter, which now numbers 75.

After a brief curtailment in production, the Eastern Steel Co., Pottsville, Pa., resumed operations on Nov. 21, under full output, with double shift, giving employment to about 150 men.

# Iron and Steel Markets

## TO CORPORATION PRICES

### Many Reductions by Independent Steel Companies

#### Independent Rail Price Probably \$57, Against \$47 Base

General reductions in the prices of independent steel companies have come in the past week. In some cases announcements have been made that the Steel Corporation's prices would be met, one large Pittsburgh company indicating that it would sell plates at 2.65c., structural shapes at 2.45c. and bars at 2.35c., Pittsburgh, and wire nails at \$3.25 per keg. In other cases the reductions have become public through the meeting of Steel Corporation prices in actual transactions.

Prices above the Steel Corporation level still exist on a number of products. The situation is, in brief, that the independent producers are getting more money for products for which they still have fair-sized contracts—products on which the Corporation is rather fully booked. Prices on wrought pipe, for example, are quite well maintained.

Some of the reductions came along rather promptly after the Steel Corporation's statement that it contemplated no change in its prices, bars being first to get to the Industrial Board basis. But thus far none of the cuts have had any effect on buying; in fact some sellers have made no effort to take business on the new basis, being more concerned about getting the higher figures on unfilled orders. At the same time it is realized that these orders will not last long and cancellations have cut into them seriously.

The situation as to rails is still much discussed in view of the large orders already placed and the probability that 1921 will be the largest rail year in a decade, with a total well above 3,000,000 tons. Seeing that the total consumption of the heavier rails in the six full years since 1913 was 4,500,000 tons below that of the preceding six years it is not surprising that standard section orders for 1921 are running more than 20 per cent larger than in recent years.

Indications now point to a dual price on rails—a \$47 Steel Corporation base for open-hearth rails and a \$57 price for rails furnished by certain independent mills. To these prices are to be added various extras, as for the nick-and-break test and for the larger discard required by some railroads, and it is likely that these extras will be higher, at least on the \$47 rails.

The week's car orders amount to 3000, of which 2000 are for the Louisville & Nashville and 1000 for the Northern Pacific. Of the steel required, 18,000 tons will be furnished by the Carnegie Steel Co. and 12,000 tons by the Illinois Steel Co.

Something of a check to cancellations has come in the past ten days, and a better idea may be had soon of the real rate of consumption in industries supplied by steel works. Unemployment in such industries is still increasing.

In sheets at least three important competitors of the Steel Corporation would meet its prices on any considerable tonnage, but buying on any scale is lacking. In tin plate any business offering for 1921 could be put through at the Steel Corporation's \$7 price.

Wage reductions at steel works are discussed in some quarters as though impending, and elsewhere as not to be looked for until retail prices of food and other necessities have come down much further. Sliding scale wages, as in sheet and tin plate and bar iron mills, are falling, but such workers are largely high-priced men.

The Steel Corporation's unfilled orders were probably not much more reduced in November than in October, and its operation at 80 per cent or more of capacity is likely to be maintained for some months, barring winter blockades.

Pig iron producers declare that their prices cannot be reduced to the Industrial Board levels of \$25.75 for basic and \$26.75 for No. 2 foundry, without causing the blowing out of a large number of blast furnaces, and they point to the fact that prices of coke which prevailed at the time the Industrial Board prices on pig iron were announced were several dollars per ton lower than present prices, and that advances in freight rates and wages have greatly increased the cost of making pig iron. The force of the argument is generally recognized, but the trend of pig iron prices continues downward. An important maker of Northern charcoal iron has begun selling for 1921 delivery at \$5 below recent quotations, but such iron can be had at still lower prices on resale lots. The same is true in the case of Jackson County silveries, on which prices have been sharply reduced, and wherever furnaces have shown a disposition to reduce their prices, resellers have gone still lower.

With the season of navigation on the Great Lakes virtually closed, the ore shipments for the year amount to over 58,000,000 tons, or fully a million tons more than was estimated a month ago.

A few notable sales stand out in the general slump in export trade. One was of 15,000 tons of rails by the United States Steel Products Co. to the Dutch Government for delivery in 1921.

## Pittsburgh

PITTSBURGH, Nov. 30.

Restoration of single quotations on the three major products of steel is an established fact, following the action last Friday morning of the Jones & Laughlin Steel Co. in reducing its prices on plates, shapes and bars to the Industrial Board prices of 2.65c., 2.45c. and 2.35c., respectively. Practically all of the important independent makers of these products have followed suit. The Jones & Laughlin Steel Co. also has adopted the price schedule of the Steel Corporation on wire products, but this step has not been followed by other independent manufacturers, although a couple of them have revised downward their prices, one making a reduction of \$10 per ton and the other \$5 a ton from their most recent quotations. Independent sheet prices remain above the March 21, 1919, schedules, although the leading interest, which will open its books Dec. 1



## A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics

At date, one week, one month, and one year previous

For Early Delivery

Pig Iron, Per Gross Ton:	Nov. 30, 1920	Nov. 23, 1920	Nov. 1, 1920	Dec. 2, 1919
No. 2X, Philadelphia...	\$40.79	\$42.79	\$48.79	\$38.10
No. 2, Valley furnace...	38.00	39.00	42.00	32.50
No. 2 Southern, Cin'ti...	42.50	42.50	42.50	37.60
No. 2, Birmingham, Ala...	38.00	38.00	38.00	34.00
No. 2, foundry, Chicago...	37.00	40.00	40.00	35.00
Basic, del'd, eastern Pa...	38.46	41.16	44.46	32.00
Basic, Valley furnace...	33.00	35.00	38.50	33.00
Bessemer, Pittsburgh...	36.96	39.46	43.96	35.40
Malleable, Chicago...	37.50	40.50	40.50	35.50
Malleable, Valley...	37.00	37.50	42.00	33.00
Gray forge, Pittsburgh...	38.96	39.96	43.96	33.40
L. S. charcoal, Chicago...	51.00	53.50	58.50	40.00
Ferromanganese, Atl. port.	125.00	140.00	155.00	110.00

### Rails, Billets, Etc., Per Gross Ton:

Bess. rails, heavy, at mill.	\$55.00	\$55.00	\$55.00	\$45.00
O.-h. rails, heavy, at mill.	57.00	57.00	57.00	47.00
Bess. billets, Pittsburgh...	43.50	50.00	55.00	43.00
O.-h. billets, Pittsburgh...	43.50	50.00	55.00	43.00
O.-h. sheet bars, P'gh...	47.00	55.00	62.50	46.00
Forging billets, base, P'gh.	56.00	60.00	65.00	60.00
O.-h. billets, Phila...	55.74	55.74	60.74	48.00
Wire rods, Pittsburgh...	57.00	65.00	70.00	58.00

### Finished Iron and Steel,

Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Iron bars, Philadelphia...	4.35	4.60	4.85	3.245
Iron bars, Pittsburgh...	3.63	4.50	4.75	3.25
Iron bars, Chicago...	3.75	3.75	3.75	2.77
Steel bars, Pittsburgh...	2.35	3.00	3.00	2.75
Steel bars, New York...	2.73	3.38	3.38	3.12
Tank plates, Pittsburgh...	2.65	2.85	2.85	2.65
Tank plates, New York...	3.03	3.38	3.38	2.92
Beams, etc., Pittsburgh...	2.45	3.00	3.00	2.45
Beams, etc., New York...	2.83	3.38	3.38	2.72
Skelp, grooved steel, P'gh.	3.00	3.25	3.25	2.45
Skelp, sheared steel, P'gh.	3.00	3.50	3.50	2.65
Steel hoops, Pittsburgh...	3.05	4.00	5.00	3.25

\*The average switching charge for delivery to foundries in the Chicago district is 70c. per ton.  
†Silicon, 1.75 to 2.25 ‡Silicon, 2.25 to 2.75.

The prices in the above table are for domestic delivery

Sheets, Nails and Wire,	Nov. 30, 1920	Nov. 23, 1920	Nov. 1, 1920	Dec. 2, 1919
Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Sheets, black, No. 28, P'gh.	4.85	5.50	6.50	4.35
Sheets, galv., No. 28, P'gh.	6.00	6.70	7.75	5.70
Sheets, blue an't'd, 9 & 10.	3.90	4.50	4.90	3.55
Wire nails, Pittsburgh...	3.25	4.25	4.25	3.50
Plain wire, P'gh...	3.25	3.75	3.75	3.10
Barbed wire, galv., P'gh...	4.10	4.45	4.45	4.25
Tin plate, 100-lb. box, P'gh.	\$7.00	\$7.00	\$8.50	\$7.00

### Old Material,

Per Gross Ton:

Carwheels, Chicago	\$27.00	\$32.50	\$33.00	\$30.00
Carwheels, Philadelphia...	30.00	36.00	39.00	30.00
Heavy steel scrap, P'gh...	20.00	20.00	26.00	23.00
Heavy steel scrap, Phila...	17.00	18.00	21.00	22.50
Heavy steel scrap, Ch'go...	17.00	17.50	19.50	20.50
No. 1 cast, Pittsburgh...	29.00	29.00	38.00	28.00
No. 1 cast, Philadelphia...	31.00	31.00	37.00	30.00
No. 1 cast, Ch'go (net ton)	21.50	21.50	26.00	29.50
No. 1 RR. wrot, Phila...	23.00	24.50	27.00	30.00
No. 1 RR. wrot, Ch'go (net)	15.50	16.00	19.00	23.00

### Coke, Connellsville,

Per Net Ton at Oven:

Furnace coke, prompt...	\$7.50	\$8.00	\$9.00	\$6.50
Furnace coke, future...	9.00	9.00	12.00	6.00
Foundry coke, prompt...	8.50	9.00	11.00	7.00
Foundry coke, future...	10.00	10.00	13.00	7.00

### Metals,

Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Lake copper, New York...	14.00	14.50	15.00	18.75
Electrolytic copper, N. Y.	13.50	14.50	15.00	18.25
Zinc, St. Louis...	5.60	6.00	6.90	8.10
Zinc, New York...	6.00	6.40	7.35	8.45
Lead, St. Louis...	5.25	6.00	6.65	6.55
Lead, New York...	5.25	6.00	6.90	6.75
Tin, New York...	33.50	37.00	39.50	54.00
Antimony (Asiatic), N. Y.	5.75	5.87 1/2	6.37 1/2	9.25

and do not necessarily apply to export business.

for first half business, reaffirms these prices. The difference between the minimum prices of the independent sheet makers and of the American Sheet & Tin Plate Co., however, now is a matter of only \$10 per ton on black sheets, \$7 per ton on blue annealed and \$6 on galvanized.

While the general situation in steel is unsettled and to a considerable extent complicated by the fact that a number of companies still are figuring costs and trying to arrive at a price policy, it must be said that with the possible exception of pipe the Industrial Board schedules have been practically re-established in the finished lines. To be sure, all companies have not yet marked their public quotation to these levels, but as is usually true of a dull market like the present one, prices are made by those naming the lowest figures, and it is also a well-established fact that orders now are to be obtained only after considerable competition.

In semi-finished steel the market is not at all well defined, as there is so little going on. Steel Corporation prices, which are about \$5 per ton above the Industrial Board recommendations, probably could be done with independent mills, but this is conjecture, owing to the lack of sales.

While some business has come out as a result of the price reductions, it cannot be said that buyers have fallen over one another to secure places upon the books of the manufacturers. Apparently buyers do not regard prices as having struck bottom and now that the market has swung definitely in their favor, they are rather disposed to sit back and see what the future will bring forth.

A further big cut in the unfilled tonnages of the Steel Corporation is likely to be shown in the statement covering this month's operations. The corpora-

tion, in common with all other producers, has felt the contraction in buying, and it has been operating at a very high rate, not to mention the benefit derived from greatly improved car supplies and railroad transportation conditions. While present unfilled tonnages are said to be equivalent to eight months' operations, it is extremely improbable that it will continue long to refuse business for reasonably early delivery.

The Carnegie Steel Co. to-day had all of its steel making and finishing capacity except that at its Sharon, Pa., works, and a structural mill at its Thirty-third Street plant, Pittsburgh, in operation. The company also had 44 of its 49 blast furnaces blowing, a gain of one since a week ago. In percentages the company was running almost 95 per cent of its steel making and finishing capacity and 85 per cent of its blast furnaces, on a basis of 53 furnaces, being 100 per cent. Other Corporation subsidiaries also have maintained the recent high rate, with the National Tube Co. running practically full. Independent company operations meanwhile, if anything, have receded slightly and since a number claim that they cannot operate except at a loss at the lower prices, it is probable that some of them will curtail further during the remainder of this year.

Another cut of \$2 to \$2.50 per ton has been made in the asking prices of merchant producers of the steel making trades of pig iron. Better car supplies have slightly weakened the coke market and the scrap iron and steel market still is seeking lower levels.

Pig Iron.—Another week has gone by in this market without any sales of importance. Prices are merely nominal because of the lack of interest in the market on the part of melters, but basic grade is being offered by Valley furnace interests at \$33 as compared with \$35 a week ago, while standard Bessemer is offered at

\$35 as compared with \$37.50 last week. These prices, however, have found no basis in sales. It is claimed, though, that they represent actual costs, and it is probable that producers will make something of a stand at these levels, especially as it is likely that some of the steel manufacturers having a surplus of basic will be less likely to make further reductions now that sales of semi-finished and finished steel are possible only at lower prices than prevailed recently. Most merchant interests still are asking \$39 furnace, for No. 2, but it is believed that \$38 could be done on direct business, and it is known that resale tonnages are available at \$37. In all cases, prices are being named by producers, and buyers still must have their say. High manganese malleable iron is being offered at \$35, but iron of standard analysis is being held by most producers at \$37. The Claire furnace, Sharpsville, has been blown out, and will be rebuilt and enlarged.

We quote Valley furnace, the freight rate for delivery to the Cleveland or Pittsburgh district being \$1.96 per gross ton:

Basic .....	\$33.00
Bessemer .....	35.00
Gray forge .....	\$37.00 to 38.00
No. 2 foundry .....	38.00 to 39.00
No. 3 foundry .....	37.50 to 38.50
Malleable .....	35.00 to 37.00

**Ferroalloys.**—The market remains stagnant and practically no basis whatever exists in sales for quotations. There has been a general revision of quotations by producers with an idea of bringing them more in line with what probably could be done. In the case of ferromanganese, however, producers' prices remain very much above what resale tonnages can be bought for. One maker recently reduced the price on either prompt or first quarter of 1921 material to from \$170 seaboard, to \$150 seaboard, for 76 to 80 per cent alloy. As low as \$125 has been quoted on some resale tonnages for shipment over the remainder of this year and it is believed that a firm offer of \$10 to \$15 per ton less would be entertained. On direct business average 20 per cent spiegeleisen is quoted at \$72 to \$75 furnace, but no business has been done at this figure and with resale material available at \$60 and \$65 it is doubtful whether the makers to-day could obtain as much as \$70. Prices of Bessemer ferrosilicon and silvery iron have been reduced \$5 a ton, and probably an even greater concession would have to be made to secure business, in view of the fact that consumers are over supplied and the electric furnace interests are naming pretty attractive prices against electrolytic ferrosilicon of the lower grade.

We quote 76 to 80 per cent ferromanganese at \$140 to \$150, seaboard, for either domestic or English material, on direct sale for prompt delivery, and \$150 for first quarter 1921 shipment; resale tonnages \$125 to \$135 seaboard. We quote average 20 per cent spiegeleisen nominal at \$72 to \$75 furnace, on direct business and \$60 to \$65 for resale tonnages; 50 per cent ferrosilicon, nominal, \$75 to \$80 furnace, freight allowed. Bessemer ferrosilicon is quoted f.o.b. Jackson County and New Straitsville, Ohio, furnaces as follows: 9 per cent, \$61; 10 per cent, \$64.50; 11 per cent, \$67.80; 12 per cent, \$71.10. Silvery iron, 6 per cent, \$51.50; 7 per cent, \$53; 8 per cent, \$55; 9 per cent, \$57; 10 per cent, \$64.50; 11 per cent, \$62.80; 12 per cent, \$64.80. The present freight rate from Jackson and New Straitsville, Ohio, into the Pittsburgh district is \$4.06 per gross ton.

**Plates.**—Lower asking prices by independent makers have not appreciably stimulated the demand, although some small tonnages which are hanging over the market have been closed with independent mills at the new base. The Corporation still is heavily committed on plates and is not in a position to accept new business and guarantee a specified delivery.

We quote sheared plates of tank quality  $\frac{3}{4}$  in. and heavier at 2.65c., Pittsburgh, this being the quotation of both the Carnegie Steel Co. and the leading independents.

**Billets, Sheets, Bars and Slabs.**—Prices of all three forms are indefinite because of the action of some of the larger independent companies in receding to the March 21, 1919, prices on plates, shapes and bars, while in some instances on sheets they have come to within \$10 a ton of the prices named as of that date. Moreover, the American Sheet & Tin Plate Co. has opened its books for the first half of next year and has reaffirmed its present sheet and tin plate price schedules. Business in sheet bars, billets and slabs is at a standstill and owing to lack of transactions, no very clear

ideas as to prices are obtainable. Some independent companies are quoting sheet bars at \$60 and billets and slabs at \$55, while in one case \$52 on sheet bars is quoted, but generally \$50, Pittsburgh or Youngstown, is considered as high as any business could be done to-day, in view of the present unsettled market in finished products. The Corporation bases, indeed, are regarded as representative of to-day's market. The Corporation is not making any sales at present and its quotations are indefinite, but reports from the trade would indicate that its last price on 4-in. billets was \$43.50, on 2-in. billets \$47, on sheet bars \$47, on slabs \$46 and on forging billets \$56. These prices representing an advance of \$5 per ton from the March 21, 1919, level. Practically all of the Corporation business is on contract and for the present quarter there was a revision late in September which increased prices in scale contracts on an average several dollars per ton.

We quote 4 x 4-in. soft Bessemer and open-hearth billets at \$43.50 to \$50; 2 x 2-in. billets, \$47 to \$53.50; Bessemer sheet bars, \$47 to \$55; open-hearth sheet bars, \$47 to \$55; and forging billets, ordinary carbons, \$56 to \$60 base, all f.o.b. Youngstown or Pittsburgh mill.

**Structural Material.**—No awards are reported by fabricating interests in this district, although some of them continue to note a fairly good inquiry. The market on structural beams no longer is quotable at higher than the Industrial Board price, as both the Corporation and several of the larger independents now are quoting that figure. Prices are given on page 1507.

**Wire Products.**—Effective last Friday, the Jones & Laughlin Steel Co. adopted the American Steel & Wire Co.'s price schedule, which is \$3.25, base, per 100 ft. for plain wire; \$3.25, base, per keg for nails; \$3.95 for galvanized wire; \$4.10 for galvanized barbed wire; \$3.40 for painted barbed wire; \$4.20 for galvanized fence staples and \$3.50 for polished fence staples. The Pittsburgh Steel Co., effective Dec. 1 and carrying the company's card of extras, dated Sept. 22, has reduced prices about \$10 per ton. The schedule of this company is \$3.75, base, per keg for nails; \$3.25 per 100 lb. base for plain wire; \$3.35 per count keg for coated nails; \$4.35 for galvanized barbed wire; \$4.10 for painted barbed wire; \$4.45 for galvanized fence staples, and \$4 for polished fence staples. The Youngstown Sheet & Tube Co., which has been on a basis of \$4.25 base per keg for nails and \$3.75 per 100 lb. base on plain wire, it is reported, will announce a reduction of \$5 per ton, effective to-morrow.

We quote wire nails at \$3.25, base, the price of the American Steel & Wire Co. and Jones & Laughlin Steel Co., and \$3.75 and \$4, the range of other independents. We quote bright basic and Bessemer wire at \$3.25, the price of the American Steel & Wire Co., the Jones & Laughlin Steel Co. and Pittsburgh Steel Co., and \$3.50, the price of other independents.

**Hot-Rolled and Cold-Rolled Strips.**—Business remains extremely dull and prices are not at all well defined. While some makers are holding to 5c. base, for hot-rolled and 8c. base, for cold-rolled, and claim to be getting a fair amount of business at these figures, it is known that other independents are quoting \$10 per ton less and the American Sheet & Tin Plate Co. is quoting and accepting tonnages of cold-rolled strips at 6.25c. base, while there continues to be talk of a price as low as 4c. by some makers of hot-rolled strips.

**Nuts, Bolts and Rivets.**—Reductions announced in bar and wire prices by some of the independent companies have not so far affected prices of nuts, bolts and rivets, save that business at the outside prices has virtually disappeared. Those makers who did not follow the advance made around the first of October by Eastern manufacturers say that their prices are based upon the March 21, 1919, quotations for bars and wire and that they cannot make any concessions now unless they can effect reductions in producing costs. Prices and discounts are given on page 1507.

**Spikes.**—So far, the lower independent market in steel bars has not affected spike prices, even of the leading independent here which is among those which have dropped to 2.35c. for steel bars. The Louisville & Nashville Railroad have not yet closed for the 15,000



kegs of standard spikes recently inquired for, and the inquiry of the Atchison, Topeka & Santa Fe railroad for a similar quantity, put out several weeks ago and then withdrawn, has been revived. A revision of prices downward is probable, but it is likely that the margin above the steel bar base, set by the Industrial Trade Board at 1c. per lb., will be increased. It is reported here that the Illinois Steel Co. has established a base of 3.85c., which is 1½c. per lb. above the Steel Corporation base on steel bars. Fair demand is noted for small spikes for coal mine and industrial uses. Prices are given on page 1507.

**Cold Finished Steel Bars.**—Leading makers in response to the easier independent market in hot-rolled steel bars have cut the price of cold finished bars to the old base of 3.60c. established in August, 1919. This price reaffirms the Industrial Board differential of \$25 per ton over hot-rolled bars. The independent price now is \$8 per ton below the Steel Corporation price, the American Steel & Wire Co. having gone to \$4 base on this product about two months ago and still holding to that figure. Demand continues at a very low ebb and specifications against old orders are anything but heavy.

**Iron and Steel Pipe.**—No suggestion of lower prices of tubular goods has yet been made and makers generally are not looking for lower prices, at least during the remainder of the year. Fear is expressed, however, of the psychological effect on the demand when the full extent of the declines in other lines of finished steel is thoroughly known. The present condition with all makers is that they are heavily booked on both merchant pipe and oil country goods and all are inclined to hold firmly to the present schedules. All makers are operating at a high rate with the National Tube Co. running practically full in all of its plants. Cancellation of all priorities on open top cars is expected to further facilitate the shipments of tubular goods, which already has shown a marked improvement as a result of the modification of Interstate Commerce Commission order No. 20, on Nov. 16. The National Tube Co. has made a very appreciable reduction in its accumulated stocks. Price discounts are given on page 1507.

**Iron and Steel Bars.**—The market on steel bars no longer is quotable at higher than 2.35c. base. Several independents have adopted that quotation and, of course, it is also the quotation of the Carnegie Steel Co. The latter is not yet much of a factor in the prompt market, but in some instances is taking on business for comparatively early delivery. Concrete reinforcing bars also are down to 2.35c. base, with the usual extras for twisting and deforming. Common iron bars are being offered at 3.25c., Chicago, equal to 3.63c., delivered, Pittsburgh, while Eastern mills are quoting as low as 4c., mill, or about 4.35c. delivered, Pittsburgh.

We quote steel bars rolled from billets at 2.35c.; reinforced bars, rolled from billets, at 2.35c. base; common iron bars, 3.63c. to 4.35c., delivered Pittsburgh; refined iron bars, 5c. to 5.50c., in carloads, f.o.b. mill, Pittsburgh.

**Wire Rods.**—Prices are rather indefinite at the moment because of the lower prices which have been named by several of the independent producers of wire products. One independent has withdrawn all quotations and is quoting only upon application. As high as \$65 is being quoted by some makers, but this is out of the question for the non-integrated manufacturers, who must compete with the lower prices which prevail on the finished products. It is doubtful whether more than the Steel Corporation level of \$57 for ordinary soft rods could be obtained to-day. Prices are given on page 1507.

**Skelp.**—There having been no suggestion of lower prices for tubular goods, the skelp market is showing relatively more firmness than other forms of semi-finished steel. The leading independents are quoting 3c. on grooved or universal steel skelp. So far as can be learned, the Corporation still is quoting grooved skelp at 2.45c., universal at 2.55c. and sheared at 2.65c.

**Sheets.**—The independent market is working toward the Industrial Board quotations. One Valley producer

has announced a price of 4.85c., base, for black sheets, 6.20c., base, for galvanized, and 4.05c., base, on blue annealed. These prices are exactly \$10 a ton above the prices of the American Sheet & Tin Plate Co., which will open its books for first half of 1921 tonnages tomorrow and hold to the Industrial Board schedule. The Apollo Steel Co. also has announced new prices, naming 5c., base, on black sheets, 6c. on galvanized and 3.90c. on blue annealed. In connection with the opening of the books by the leading interest it is stated that on account of the heavy carryover from this year and the shortage of sheet bars, it will be obliged to allot its production among its regular customers. Present bookings of this company are estimated to be sufficient to keep its plants running full over the first three months of 1921, and since full operation is impossible, it is probable present orders will stretch out to an even longer time, although an increase in the supply of steel and in the efficiency of the workmen might enable it to catch up with its orders more promptly. Buyers still are expecting lower independent prices and are not doing much. It is admitted that 6c. would yield some profit on galvanized sheets, in view of the fact that the zinc now is as low as 5.65c. per lb. Prices are given on page 1507.

**Tin Plate.**—The American Sheet & Tin Plate Co. opens its books for first quarter and first half of 1921 business tomorrow at the old base of \$7 per box. The company has so much unfilled business on its books that its output will be allotted to its regular customers. Although the company will not have much weight in the early part of the year in the matter of open market supplies, the fact that it has named \$7 means that can companies served by it will name prices based on that figure and those serving other manufacturers will have to meet this price to enable their customers to compete in the container market. Current activities in tin plate are very limited and stock items which represent the spot market, readily are obtainable at \$7 per box.

We now quote tin plate to domestic consumers at \$7 per base box; stock items, \$7, and for export, \$8 to \$9 per base box, all f.o.b. Pittsburgh.

**Steel Rails.**—Independent prices of light rails have not been affected by the reduction in prices of other lines of finished steel. One independent is pretty well filled up and is not inclined to consider less than 3c. on new business, while another reports having taken orders in the past week at 3.25c. The Carnegie Steel Co. holds to the old base of 2.45c. for 25 to 45-lb. sections, but is not taking business for early delivery.

We quote 25 to 45-lb. sections from 2.45c., the price of the Carnegie Steel Co., to 3c. to 3.25c., the range of the independent makers rolling from new steel; 16-lb. and 20-lb. sections are priced 4¼c. per 100 lb. higher than the base sizes, 12-lb. and 14-lb. sections 9c. per 100 lb. above base and 8-lb. and 10-lb. sections 13¼c. per 100 lb. above base. Standard sections, 50 lb. and heavier, are quoted by the Carnegie Steel Co. at \$45 for Bessemer and \$47 for open hearth stock and by independent mills from \$55 to \$65 for Bessemer and \$57 to \$67 for open-hearth rails.

**Hoops and Bands.**—The leading independent in this district has adopted the Corporation base of 3.05c., and this may be considered as representative of the current market, although other makers have not yet taken action with regard to new prices.

**Coke.**—Although a slightly firmer market in coal is not entirely without effect upon the price ideas of the producers of beehive oven coke, the demand for the latter has further declined, and since supplies are larger as a result of improved car placements, the market is quotable about 50c. per ton below the levels of a week ago. Occasional sales of furnace coke have been noted at \$8.25 and \$8.50 per net ton, oven, in the past week, but in the past few days \$8 has become the general maximum, and enough business has been done at \$7.50 to give that price a basis. Generally, foundry coke has been salable at a premium of \$1 a ton over furnace grade, or from \$8.50 to \$9 per net ton, oven, but cases are heard where the spread between the two grades has been a matter of only 50c. per ton. Some of the steel companies are reported to be offering spot tonnages of by-product coke as low as \$6 at ovens, and some beehive furnace coke from the Latrobe, Pa., district has sold as low as \$6.50 at oven. No interest is being taken by either furnace or foundry users in first half of 1921



requirements, and prices are indefinite. It is reported that one producer who took considerable first half foundry business on a basis of \$15 per net ton, oven, is voluntarily revising such contracts to a basis of \$10.

**Old Material.**—The trend of prices still is downward because practically all melters are holding up shipments against contracts and are absolutely out of the market as far as new purchases are concerned. Prices entirely are nominal and the quotations given represent entirely forced sales by shippers unable to get buyers to accept deliveries. If consumers were to enter the market for supplies to-day, they could not buy within several dollars a ton of the prices quoted, but in the lack of any consumptive demand, the quotations of necessity must be those made by sales of material which must be reconsigned promptly. Machine shop turnings are hard to place and a Pittsburgh district company could not sell its October tonnage above \$9, f.o.b. its works, or \$10.50, delivered Pittsburgh.

We quote for delivery to consumers' mills in the Pittsburgh and other districts that take Pittsburgh freight rates, as follows:

Heavy melting steel, Steubenville, Follansbee, Brackenridge, Monessen, Midland and Pittsburgh.....	\$20.00 to \$20.50
No. 1 cast cupola size.....	29.00 to 30.00
Rerolling rails, Newark and Cambridge, O.; Cumberland, Md., Franklin, Pa., and Pittsburgh....	26.00 to 27.00
Compressed sheet steel.....	18.00 to 19.00
Bundled sheet sides and ends, f.o.b. consumers' mills, Pittsburgh dist..	12.50 to 13.00
Railroad knuckles and couplers.....	20.50 to 21.00
Railroad coil and leaf springs.....	20.50 to 21.00
Railroad grate bars.....	21.00 to 22.00
Low phosphorus melting stock, bloom and billet ends, heavy plates, ¼-in. and heavier.....	26.00 to 27.00
Railroad malleable.....	26.00 to 27.00
Iron car axles.....	41.00 to 42.00
Locomotive axles, steel.....	35.00 to 36.00
Steel car axles.....	32.00 to 33.00
Cast iron wheels.....	34.00 to 35.00
Rolled steel wheels.....	20.50 to 21.00
Machine shop turnings.....	11.50 to 12.00
Sheet bar crop ends (at origin).....	23.00 to 24.00
Heavy steel axle turnings.....	16.00 to 17.00
Short shovel turnings.....	14.00 to 15.00
Heavy breakable cast.....	25.00 to 26.00
Stove plate.....	23.00 to 24.00
Cast iron borings.....	15.00 to 16.00
No. 1 railroad wrought.....	24.00 to 25.00

## VICTORY FOR RAILROADS

### Interstate Commerce Commission Assumes Jurisdiction Over Intrastate Rates

WASHINGTON, Nov. 30.—The railroads have won a victory in the action of the Interstate Commerce Commission in assuming jurisdiction over intrastate rates. Unless the Supreme Court of the United States, to which the controversy will be carried, holds that the commission exceeded its authority, its increase of intrastate rates to the level of the new interstate rates will substantially aid the roads in making the showing in earnings that they expected under the new rates. Practically complete returns on the earnings for September, the first month of the increased interstate rates, show that the net railway operating income totaled \$79,876,655, which was \$29,343,000, or 26.9 per cent short of the total of \$109,220,000, which should have been earned on the basis of the annual return of 6 per cent.

Taking into consideration the fact that much of the traffic carried and paid for in September was started under the old rates in August and also the fact that about one-half the States refused to advance intrastate passenger fares, and in some cases freight rates also, railroad officials are not surprised that the net operating income in September fell as low as it did. The October earnings, it is expected, will show a substantial improvement, inasmuch as all interstate traffic carried in that month will be at the new rates and by

## GERMANY BIDS LOW ABROAD

### Underbids American Exporters in Sweden and Holland—Japanese Prices Still Declining

NEW YORK, Nov. 30.—While German competition in iron and steel is reported by export representatives in practically all markets, it is particularly severe in European countries where Germany is regarded as determined to sell, regardless of price. An exporter in New York recently submitted quotations on a 20,000-ton order for 60-lb. rails to Sweden, but the order went to the German bidder for \$51.50 per ton, c.i.f. Swedish port. An evidence of Germany's determination to underbid all others is shown in a recent request for quotations on a heavy tonnage of plates from Holland. The German mill first quoted the equivalent of 2.60c. per lb. Pittsburgh, or 3.50c. per lb. c.i.f. Holland. When the American exporter met the price, the German company reduced its quotation to the equivalent of 2c. per lb. Pittsburgh, and received the order.

Recent cables from Japan state that the market there is generally weaker, caused by the depression in Europe. Several failures of brokers in London who had connections with Japan are reported. Prices of most iron and steel materials are off from 10 per cent to 15 per cent from the prices prevailing Nov. 1. Pig iron of Japanese origin, which has held steadily at from 90 yen to 95 yen, despite violent fluctuations in other materials, is now down to 85 yen per ton. Some business is coming from Japan, particularly in ship plates. One New York exporter recently received a cable for immediate quotation on 1000 tons of ship plates for a Japanese shipyard. Exports from the United States to Japan during September totaled 28,616 gross tons, of which about 12,740 tons were ship plates. September shipments were almost 45 per cent less than the August tonnage.

The bill now before the Diet providing for a higher tariff on iron and steel, will increase the present specific duty to about 10 per cent ad valorem on pig iron and about 15 per cent on other materials. Doubt is expressed in some quarters that such a small percentage will provide sufficient protection, in view of the high cost of production in Japan.

the middle of the winter, unless court injunctions interfere, there will be further increases in earnings from the increased intrastate rates. In most sections of the country, it is the expectation that the new rates will prove ample, barring, of course, a serious slump in traffic on account of unfavorable business conditions.

The first intrastate case decided by the Interstate Commerce Commission was that of the State of New York. In that State the case involved intrastate passenger fares, excess baggage rates, and milk and cream rates. In some of the other States the question of freight rates also is involved. In most cases State commissions granted an increase in freight rates on intrastate rates, but in a few instances the increase is not as great as allowed on interstate rates.

The questions involved are far-reaching in importance. The State commissions which have banded together to fight the proposition have declared that the action taken would mean the stripping of the State commissions of the last vestige of power over intrastate rates. While the transportation act includes a provision that the Interstate Commerce Commission may fix intrastate rates in cases where they are discriminatory as related to interstate commerce the State commissions contend that no such sweeping authority was intended as to permit the Federal body to change the entire intrastate rate structure.

Property of the American Standard Shipfittings Corporation, Roberts Avenue and Sawmill River Road, Yonkers, N. Y., bankrupt, comprising machinery, etc., will be sold by Alfred C. Coxe, Jr., receiver.

## Chicago

CHICAGO, Nov. 30.

Price adjustments are developing rapidly, and a stable market seems to be in sight. A number of independent mills have reduced their quotations on plates, shapes and bars to the Steel Corporation level, and the Jones & Laughlin Steel Co. has also met the leading interest's prices on wire and wire nails. Merchant blast furnaces are commencing to recognize changed conditions by marking down their previous prices. Several of the smaller Southern furnaces have reduced their quotations on foundry to \$38 base, Birmingham, thereby meeting the price of the Tennessee company and an important Northern charcoal iron producer has opened books for 1921 at \$5 below previous furnace quotations. Jackson County silvery furnaces have also reduced prices \$5 a ton. Cast-iron pipe prices are weak and an early reduction is looked for.

Operating conditions in this territory are practically unchanged, although the Iroquois Iron Co. will probably blow out a third furnace to-morrow.

Current business is light, the most important development of the week being the placing of 3000 railroad cars. Two thousand hopper cars have been bought by the Louisville & Nashville and 1000 box cars by the Northern Pacific. Fifteen hundred of the hopper cars are to be built in an Eastern plant of the American Car & Foundry Co. and the steel amounting to 18,000 tons will be furnished by the Carnegie Steel Co. About 12,000 tons of steel for the remaining 500 hopper cars to be built by the Mount Vernon Car Mfg. Co. and for the box cars which will be constructed in a Western plant of the American company, will be furnished by the local Steel Corporation subsidiary.

**Pig Iron.**—Buying is still at a low ebb, but a few producers have abandoned their attitude of aloofness and have reduced their quotations materially. Several of the smaller Southern furnaces are now quoting on the basis of \$38 base, Birmingham, for foundry, thereby meeting the price which has been quoted for some time by the Tennessee Coal, Iron & Railroad Co. An important northern charcoal iron producer has opened books for 1921 delivery at \$50 furnace for iron averaging 1½ per cent silicon. The local producers have made no change in quotations, but have adopted the Redfield differentials for added silicon content. Thus Northern No. 1, which was formerly quoted at \$2.25 above the base grade of foundry, is now but \$1.25 higher. Jackson County silvery producers have reduced prices \$5 a ton, making the quotation on 7 per cent \$53, furnace. Notwithstanding declines in furnace prices, resale offerings still dominate the market. Resale transactions, however, are bringing out a diversity of prices, and it is difficult to ascertain a ruling market level. On Northern iron the quotation of the leading steel interest of \$39, Milwaukee, for No. 2 foundry is apparently the maximum going price. Although occasionally iron is offered for less, the ruling range of prices is from \$37 to \$40, Chicago, for No. 2 foundry. On Southern foundry, the range is from about \$36 to \$38 base, Birmingham. Resale silvery is available at about \$52.32, delivered Chicago, and resale lots of copper-free low phosphorus at from \$47 to \$49, Ohio furnace. Resale charcoal iron can be bought on the basis of \$51, delivered Chicago. Market activity is confined largely to the sale of car lots, although three inquiries for 500 tons each of foundry, malleable and charcoal are before the trade. On all of these prompt shipment is asked. Sellers are looking forward to the revival of demand and opinions differ as to when that revival will occur. Some observers believe that most of the resale iron will be absorbed by the first of the year and others feel that a change will not come until existing stocks in foundry yards are used up. These stocks on the present basis of foundry operation will last for two or three months. Furnace operation in the district is unchanged, but it is probable that a third Iroquois furnace will go out to-morrow. Beehive foundry coke of good quality is available at from \$9.50 to \$10, Connellsville, on prompt

shipments. The local by-product producer has again reduced its quotation on foundry coke \$1 a ton, making the present price \$16, ovens. To a large extent the appended quotations represent resale prices.

The following quotations are for iron delivered at consumers' yards except those for Northern foundry, malleable and steel-making irons, including low phosphorus, which are f.o.b. furnace and do not include a switching charge averaging 70c. per ton.

Lake Superior charcoal, averaging sil.	
1.50 1921 delivery (producers' price, deliv. at Chicago) .....	\$53.50
Lake Superior charcoal, prompt shipment (resale) .....	51.00
Northern coke, No. 1 sil, 2.25 to 2.75 .....	\$38.25 to 41.25
Northern coke foundry, No. 2, sil, 1.75 to 2.25 .....	37.00 to 40.00
Northern high phos. ....	37.00 to 40.00
Southern coke, No. 1 foundry and No. 1 soft, sil, 2.75 of 3.25 .....	45.67 to 47.67
Southern coke, No. 2 foundry, sil, 2.25 to 2.75 .....	43.92 to 45.92
Southern foundry, sil, 1.75 to 2.25 .....	42.67 to 44.67
Malleable, not over 2.25 sil .....	37.50 to 41.50
Basic .....	37.00 to 41.00
Low phos. Eastern furnace (copper free) .....	47.00 to 49.00
Silvery, 7 per cent .....	52.32

**Plates.**—For the first time in a year and a half, ruling market quotations on plates, shapes and bars are uniform. As previously noted, the leading local independent has been meeting the Steel Corporation prices on plates and shapes for several weeks. As a result of reductions made within the past few days, this mill and several other independents are now quoting the same prices as the leading interest on plates, shapes and bars. Whether this action will bring out an early resumption of buying is not yet clear, but it is thought that it will at least prove a stabilizing influence. It has been the feeling of some observers that high prices often constituted the real explanation for efforts to cancel contracts or to secure extensions, although consumers have not lacked in ingenuity in assigning other reasons therefor. It is probable that the hope of holding business still on the books through an adjustment of prices governing unfilled contracts was one of the incentives for marking down quotations. The plate market is still quiet, the most important development being the purchase of 2000 hopper cars by the Louisville & Nashville. Of these cars, 1500 will be built by the American Car & Foundry Co., and 500 by the Mount Vernon Car Mfg. Co. The steel amounting to 24,000 tons will be furnished by the leading interest, but whether all of it will be rolled by the local subsidiary depends on the assignment of the cars booked by the American Car & Foundry Co. among its constituent plants. The Northern Pacific is inquiring for 1000 double sheathed box cars of 40 tons capacity, which will require about 6000 tons of steel.

The mill quotation is 2.65c. Pittsburgh, the freight to Chicago being 38c. per 100 lb. Jobbers quote 3.78c. for plates out of stock.

**Structural Material.**—Several mills in addition to the local independent are now quoting the Steel Corporation price on plain material and it is unlikely that any business is being booked at higher prices. This development has not yet increased buying, but is believed to have brought a resumption of activity much nearer. Fabricating business is light. Lettings include:

The Great Western Sugar Co., Johnstown, Col., 400 tons, to Minneapolis Steel & Machinery Co.

Maul Agricultural Co., structural steel for Pal pipe line. Pala, Maui, Hawaii, 678 tons, to unnamed fabricator.

Highway spans over Yakima River on Moxee Road, Washington, 263 tons, to Minneapolis Steel & Machinery Co.

Corn Products Refining Co., three buildings, Kansas City, 167 tons, to unnamed bidder.

Shasta Zinc & Copper Co., reverberatory furnace cooling chambers and feed hoppers, Pitt, Shasta County, Cal., 114 tons, to Minneapolis Steel & Machinery Co.

Union Pacific system, plate girder span, bridge, Lun, Oregon, 60 tons, to McClintic-Marshall Co.

The mill quotation is 2.45c. Pittsburgh, which takes a freight rate of 38c. per 100 lb. for Chicago delivery. Jobbers quote 3.58c. for materials out of warehouse.

**Sheets.**—The gap between the quotations of the independents and those of the leading interest is slowly being closed. One mill is now quoting 4.05c. base, Pitta-



burgh, on blue annealed, 4.85c. on black and 6.20c. on galvanized. Another maker is asking 3.90c. for blue annealed and a quotation of as low as 6c. on galvanized is reported. If an attractive inquiry should appear, a reduction by an independent to the Steel Corporation level would not be surprising. Current business, however, is very light. The local independent has not yet fixed any prices, but has booked a few orders for first quarter shipment on the understanding that prices will be announced by Jan. 1, or before, and that specifications will be filed at that time. The warehouse of the leading interest has blue annealed and black sheets in stock which it is offering at less than the prices of other jobbers.

Mill quotations are 4.35c. to 5.50c. for No. 28 black; 3.55c. to 4.50c. for No. 10 blue annealed, and 5.70c. to 6.75c. for No. 28 galvanized, these all being Pittsburgh prices, subject to a freight to Chicago of 38c. per 100 lb.

Jobbers quote: Chicago delivery out of stock, No. 10 blue annealed, 4.68c. to 6.13c.; No. 28 black, 5.73c. to 7.10c.; No. 28 galvanized, 8.60c.

**Ferroalloys.**—The market is quiet and the price situation is unchanged.

We quote 75 to 80 per cent ferromanganese; resale, \$150 to \$160, delivered; 50 per cent ferrosilicon at \$80 to \$85, delivered; spiegeleisen, 18 to 22 per cent, resale, \$60 to \$65, furnace.

**Bars.**—The leading local independent and several mills further east have reduced their quotations on mild steel bars to the Steel Corporation level. This action wipes out a range in prices which has existed for a year and a half. Current business is light, but heavier inquiry is looked for. Demand for bar iron is at a low ebb and the nominal quotation is still 3.75c., Chicago. The light inquiry for rail carbon steel bars is accounted for by the curtailed activities of the principal consumers, agricultural implement, fence post and spring bed manufacturers and reinforced concrete construction companies. At least one hard steel bar maker is quoting as low as 2.75c., mill.

Mill prices are: Mild steel bars, 2.35c., Pittsburgh, taking a freight of 38c. per 100 lb.; common bar iron, 3.75c., Chicago; rail carbon, 2.75c. to 3.25c. mill; cold rolled, 5.25c. to 5.90c. for rounds; 5.75c. to 6.40c. for flats, squares and hexagons.

Jobbers quote 3.48c. for steel bars out of warehouse. The warehouse quotation on cold rolled steel bars is 5.90c. for rounds and 6.40c. for flats and squares, an extra of 15c. per 100 lb. applying to orders exceeding 1000 lb. and under 2000 lb. and an extra 35c. on orders up to 1000 lb. Jobbers quote hard and medium deformed steel bars at 3.48c. base.

**Wire Products.**—The announcement by the Jones & Laughlin Steel Co. that its wire prices will be adjusted has aroused speculation as to whether the quotations of the leading interest will be met. The general demand has fallen off, buying in the south being particularly light. Wire nails, however, are still much sought after and plain wire is being bought in fair volume. Because of the advanced season, sales of barbed wire are much reduced. Notwithstanding the curtailment in buying in some directions, the bookings of the foremost producer are holding up well and mill operations are full. For mill prices, see finished iron and steel f.o.b. Pittsburgh, page 1507.

**Rails and Track Supplies.**—Railroads with 1921 contracts or reservations for rails and track supplies are showing considerable concern over the prices which will be fixed on the fastenings, although they seem satisfied to wait for the decision of the Steel Corporation on rails. This would indicate that independent competition on the fastenings has reached a point where it commands attention, although definite information as to prices quoted is lacking. It is felt, however, that an announcement of prices on rails and fastenings will be forthcoming during the current week, and the consensus of opinion is that no advance will be made.

Standard Bessemer rails, \$45 to \$55; open-hearth rails, \$47 to \$57. Light rails, 2.45c. to 3c., f.o.b. makers' mills. Standard railroad spikes, 3.65c. to 4c., Pittsburgh. Track bolts with square nuts, 4.60c. to 5c., Pittsburgh. Steel tie plates, 3c. to 3.50c. and steel angle bars, 2.75c., Pittsburgh and Chicago; tie plates, iron, 3.75c. f.o.b. makers' mills.

**Bolts and Nuts.**—Although demand is diminishing, a few good sized orders have been received from jobbers and some recent cancellations from agricultural

implement manufacturers have been partly replaced by new specifications. Quotations on a few items published below have declined, notably larger sizes of small machine bolts, larger sizes of carriage bolts, and lag bolts.

Manufacturers quote: Large structural and ship rivets, \$4.50 to \$4.85; large boiler rivets, \$4.60 to \$4.95; small rivets, 25 to 60 per cent off; small machine bolts, rolled threads, 40 and 5 off; cut out threads, 30 and 10 off; longer and larger sizes, 30 and 10 to 40 and 5 off; carriage bolts,  $\frac{1}{2}$ -in. by 6-in., smaller and shorter rolled threads, 30 and 10 off; cut threads 30 off; longer and larger sizes, 25 and 10 to 40 off; lag bolts, 45 and 5 to 50 and 10 off; plow bolts, Nos. 1, 2 and 3 heads, 30 off to 50 and 5 off; other style heads, 25 per cent to 20 per cent extra; hot pressed square and hexagon blank nuts, \$1.75 to \$2 off list; tapped nuts, \$1.25 to \$1.75 off list; tire bolts, 50 per cent off to 60 and 10 per cent off; track bolts, 6c. to 7c. base. All prices carry standard extra f.o.b. Pittsburgh.

Jobbers quote structural rivets, 5.08c. to 5.73c.; boiler rivets, 5.18c. to 5.83c.; machine bolts up to  $\frac{3}{4}$  x 4 in., 30 per cent off; larger sizes, 20 off; carriage bolts up to  $\frac{3}{4}$  x 6 in., 20 off; larger sizes, 15 off; hot pressed nuts, square tapped and hexagon tapped, list price; blank nuts, list price; coach or lag screws, gimlet points, square heads, 40 per cent off. Quantity extras are unchanged.

**Cast-Iron Pipe.**—Mattoon, Ill., has awarded 100 tons to the United States Cast Iron Pipe & Foundry Co. The market is dull and prices are weak, although no official reductions in prices have been announced.

We quote per net ton f.o.b. Chicago, ex-war tax as follows: Water pipe, 4-in., \$88.10; 6-in. and above, \$83.10, class A and gas pipe, \$4 extra.

**Old Material.**—Prices continue to decline, but evidences of interest by the consumers indicate that the bottom is believed to be in sight. Recent purchases by users include 1250 tons of rerolling rails at \$18.25 per gross ton and 800 tons of railroad malleable at \$18.50 a gross ton. A fair tonnage of heavy melting has also moved within the past week or two. Railroad offerings include the Pennsylvania, Northwestern System, 2400 tons, the Rock Island, 2200 tons, the Santa Fe, 2000 tons and the New York Central a blind list.

We quote delivery in consumers' yards, Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton	
Iron rails	\$27.00 to \$27.50
Relaying rails	45.00 to 50.00
Car wheels	27.00 to 27.50
Steel rails, rerolling	18.00 to 18.50
Steel rails, less than 3 ft.	18.50 to 19.00
Heavy melting steel	17.00 to 17.50
Frogs, switches and guards, cut apart	17.00 to 17.50
Shoveling steel	16.50 to 17.00
Low phos. heavy melting steel	21.00 to 21.50
Drop forge flashings	13.00 to 13.50
Per Net Ton	
Iron angles and splice bars	26.50 to 27.00
Steel angle bars	16.50 to 17.00
Iron arch bars and transoms	29.00 to 29.50
Iron car axles	32.50 to 33.00
Steel car axles	20.00 to 20.50
No. 1 busheling	15.00 to 15.50
No. 2 busheling	9.50 to 10.00
Cut forge	15.50 to 16.00
Pipes and flues	10.50 to 11.00
No. 1 railroad wrought	15.50 to 16.00
No. 2 railroad wrought	15.50 to 16.00
Steel knuckles and couplers	17.00 to 17.50
Coil springs	20.00 to 20.50
No. 1 cast	21.50 to 22.00
Low phos. punchings	18.00 to 18.50
Locomotive tires, smooth	12.00 to 13.00
Machine shop turnings	7.50 to 8.00
Cast borings	10.00 to 10.50
Stove plate	21.50 to 22.00
Grate bars	15.50 to 16.00
Brake shoes	13.50 to 14.00
Railroad malleable	16.00 to 16.50
Agricultural malleable	16.50 to 17.00
Country mixed	10.50 to 11.00

## Buffalo

BUFFALO, Nov. 30.

**Pig Iron.**—No improvement is noted in the local market during the week. Inquiries are few, and most are for small tonnages, the usual request being for car load lots. One furnace reported sales of approximately 700 tons of foundry resale. Most of this order was for No. 2 plain, and is understood to have been sold for about \$38. Of the 22 furnaces in this district, it is known that at least four have been banked. Another furnace reported no sales, and that little change in the market was expected before the beginning of the new year. A local producer sold a small quantity of No. 2



foundry iron to a Cleveland buyer. The price was \$39 delivered.

We quote f.o.b. Buffalo, as follows:

No. 1 foundry, 2.75 to 3.25 sil.	\$41.00 to \$43.00
No. 2 X foundry, 2.25 to 2.75 sil.	39.25 to 41.25
No. 2 plain, 1.75 to 2.25 sil.	38.00 to 40.00
Basic	38.00
Malleable	38.00 to 40.00
Lake Superior charcoal	58.00

**Finished Iron and Steel.**—One large company has practically shut down its entire steel-making plant. Another company has put out two or three open hearths. A survey of all mills indicates that about 60 per cent of capacity is in operation. Sales are in very small lots. One mill received a few inquiries for plates, including one for 1000 to 1500 tons from abroad. The demand for tubular products continues undiminished, but quietness is noted in the wire inquiries to hand.

Warehouse prices f.o.b. Buffalo are: Steel bars, 4.05c.; shapes, 4.15c.; plates, 4.30c.; No. 10 blue annealed sheets, 4.15c.; No. 28 black sheets, 8c.; No. 28 galvanized sheets, 10c.; hoops, 5.80c.

**Old Material.**—The market in this product is no livelier than in other lines. The only activity noted was an inquiry from a buyer in eastern Pennsylvania for cast iron borings. Local dealers offered to fill this order at \$21, delivered, within a 10-day period. Considerable tonnage is still undelivered on orders contracted in the summer.

We quote dealers' asking prices per gross ton, f.o.b. Buffalo as follows:

Heavy melting steel, regular grades	\$19.00 to \$20.00
Hydraulic compressed	17.00 to 18.00
Low phos., 0.04 and under	30.00 to 31.00
No. 1 railroad wrought	26.00 to 27.00
No. 1 machinery cast	30.00 to 31.00
Iron and steel axles	35.00
Car wheels	30.00 to 31.00
Railroad malleable	23.00 to 24.00
Machine-shop turnings	12.00 to 13.00
Heavy axle turnings	17.00 to 18.00
Clean cast borings	17.00 to 18.00
Iron rails	28.00 to 29.00
Locomotive grate bars	20.00 to 21.00
Stove plate	23.00 to 24.00
Wrought pipe	16.00 to 17.00
No. 1 bushing	16.00 to 17.00
Bundled sheet stampings	12.00 to 13.00

## Cleveland

CLEVELAND, Nov. 30.

**Iron Ore.**—The ore shipping season is virtually at an end. Several of the ore firms shipped their last cargoes from upper lake ports to-day. A few more boats will be loaded in the next day or two, but the December shipments will be very light. It is not expected that any cargoes will be shipped after Thursday. With generally favorable weather conditions this month, considering the season of the year, the November movement has been larger than was expected and shipments for the season will probably run well over 58,000,000 tons, or fully 1,000,000 tons more than was estimated a month ago. Leaving out ore on which shipments were suspended late in the season, practically all the ore firms have been able to make 100 per cent shipments on contracts.

We quote delivered lower lake ports: Old range Bessemer, \$7.45; old range non-Bessemer, \$6.70; Mesaba Bessemer, \$7.20; Mesaba non-Bessemer, \$6.55.

**Rivets.**—The leading local manufacturer of rivets, following the reduction in steel prices by independent mills, has reduced prices \$5 a ton on structural and boiler rivets and is now quoting the former at 4.50c. and the latter at 4.60c., Pittsburgh. Small rivets have been marked down from 45 per cent off list to 50 per cent off. Prices named in unfilled contracts will be adjusted to the new basis. The demand is very light.

**Pig Iron.**—The market is virtually at a standstill. Furnaces report a few carlot sales of foundry iron at \$39, which several interests are quoting, although one Cleveland furnace is still asking \$41. However, furnaces in the absence of sales to establish a new basis generally regard the \$39 price as a nominal quotation and admit that a fair-sized inquiry would doubtless

bring out a considerably lower price. Resale iron is still plentiful and buyers of this are hard to find and furnaces are not inclined to meet resale iron prices on a small lot inquiry. Resale foundry iron is still quotable around \$35. The foundry melt shows no improvement and owing to the falling off in operations, many foundries have under contract nearly enough iron to last them through the first half of next year. The Globe Iron Co. has reduced its price on Jackson County silvery iron to \$55 at furnace for 8 per cent silicon, but this \$3 reduction still leaves the price \$2 a ton higher than resale silvery iron can be bought at. The United Furnace Co., Canton, Ohio, blew out its stack Nov. 25 and the Dover furnace of M. A. Hanna & Co. will go out before the end of the year. At least one other northern Ohio furnace is scheduled to go out of blast shortly.

We quote delivered Cleveland as follows, based on the new freight rates, these being a 56c. switching charge for local iron, a \$1.96 freight rate from Valley points, a \$3.36 rate from Jackson and \$6.67 from Birmingham:

Basic	\$36.96
Northern No. 2 fdy., sil. 1.75 to 2.25	\$35.56 to 39.56
Southern fdy., 2.25 to 2.75	44.67 to 46.67
Ohio silvery, sil. 8 per cent	56.36 to 58.36
Standard low phos., Valley furnace	52.00 to 55.00

**Semi-Finished Steel.**—Independent sheet mills that buy steel are awaiting the establishment of lower prices on sheet bars before meeting the late reduction in sheet prices. Locally the market has not been tested and a Cleveland mill has not yet met the Steel Corporation's price, its last quotation on sheet bars being \$55. A northern Ohio mill is offering odds and ends in billets at \$40.

**Finished Iron and Steel.**—The reduction in prices on finished steel by several of the independent mills to the Steel Corporation's price has resulted in a moderate stimulation in sales, but until general conditions improve buying is expected to be rather limited in volume. Orders that are now coming in are mostly for small lots of material for immediate requirements that have been held back pending price reductions and to fill in stocks which have become low on some items. These orders placed since the price reductions include steel bars, plates and structural material, and aggregate several thousand tons. Several independent mills have not yet met the price reductions, but the general feeling is that the mills must quote the present minimum prices or close down their plants. Among the local mills, the Bourne-Fuller Co. has not yet reduced steel bar prices, and is making no quotations. The Otis Steel Co. and the Cleveland Steel Co. have reduced their prices on plates to 2.65c., and are meeting the Steel Corporation's 3.55c. base on blue annealed sheets. Reinforcing bars are weak. While the nominal quotation is still 2.75c., it is believed that on a fair inquiry some rerolling mills would meet the 2.45c. soft steel bar price. In structural lines, new bids will be taken Dec. 17 on the Belle Isle bridge, Detroit. This will require 3300 tons of structural material and 1400 tons of reinforcing bars.

Cleveland warehouses quote steel bars at 3.34c.; plates, 3.64c. and structural material, 3.44c.; No. 9 galvanized wire, 4.70c.; No. 9 annealed wire, 4c.; No. 28 black sheets, 7c. to 8c.; No. 28 galvanized, 9c. to 9.50c.; No. 10 blue annealed, 6c. to 6.50c.

**Sheets.**—The sheet market is very irregular, with prices drawing near to those of the Steel Corporation, and the opinion is fairly general that the prices quoted by many of the independent mills will be down to those of the American Sheet & Tin Plate Co. within a few days. One Valley mill has reduced prices on sheets to 4.85c. for black, 4.05c. for blue annealed, and 6.20c. for galvanized, and another Valley mill, while not naming regular prices, is meeting conditions by making quotations that will bring business. A Cleveland mill has reduced its price to 5c. for black sheets and 4.25c. for blue annealed. Lower prices have not stimulated business materially, bringing out only small orders for early requirements.

**Bolts and Nuts.**—A leading local manufacturer has reduced prices, effective Dec. 1, on machine and car-

riage bolts, hot pressed nuts and track and lag bolts approximately 25 per cent from maximum and 15 per cent from the minimum prices that have been prevailing recently. The new quotations bring bolt and nut prices back to those that prevailed in August, 1919. The manufacturer making the cut concluded that it was advisable to make a drastic reduction so that prices would be brought down to a basis that might obviate two or three small reductions at different times. It is expected that most manufacturers will adopt the new prices. Items on the bolt and nut list not revised will probably be reduced shortly. Present contracts will be revised to the new prices and contracts will be taken for the first quarter at these prices.

**Coke.**—An inquiry for 200 tons of Connellsville prompt shipment foundry coke during the week brought out quotations ranging from \$8 to \$10. Prices on Connellsville furnace coke remain unchanged, quotations for prompt shipment ranging from \$8 to \$8.50.

**Old Material.**—The market continues stagnant and weak. While there were not many declines in prices during the week, this is attributed to an absence in sales, making quotations on a number of grades nominal. The principal activity is in heavy steel and machine shop turnings, both of which are lower. Dealers have bought small lots of heavy melting steel at \$18 to \$18.50, a decline of \$1 a ton during the week. Activity is confined to purchases by dealers to cover old orders and some of the dealers are not trying to buy or sell. A number of mills are still holding up shipments. The McKinney Steel Co. is taking scrap for its blast furnaces, but is accepting no shipments of steel making scrap for its open hearth furnaces.

Dealers quote delivered to consumers' yards in Cleveland and vicinity, as follows:

Heavy melting steel.....	\$18.00 to \$18.50
Steel rails, under 3 ft.....	22.00 to 23.00
Steel rails rerolling.....	22.00 to 23.00
Iron rails.....	22.00 to 23.00
Iron car axles.....	38.00 to 39.00
Low phos. melting scrap.....	23.00 to 24.00
Cast borings.....	14.50 to 15.00
Machine shop turnings.....	9.50 to 10.00
Mixed borings and short turnings.....	14.50 to 15.00
Short turnings for blast furnaces.....	14.50 to 15.00
Compressed steel.....	15.50 to 16.50
Railroad wrought.....	22.00 to 23.00
Railroad malleable.....	26.00 to 27.00
Steel axle turnings.....	15.00 to 15.50
Light bundled sheet stampings.....	10.00 to 11.00
Drop forge flashings over 10 in.....	10.00 to 11.00
Drop forge flashings under 10 in.....	10.00 to 11.00
No. 1 bushelings.....	13.00 to 14.00
Railroad grate bars.....	25.00 to 25.50
Stove plate.....	25.00 to 25.50
Cast iron car wheels.....	27.00 to 27.50
Pipes and flues.....	15.00 to 15.50

## Cincinnati

CINCINNATI, Nov. 30.

**Pig Iron.**—While the market continues dull, sales last week were the largest for some weeks past. Included in these were several lots of furnace iron, and though the tonnages were small, they give some idea of what operators are asking. On Northern foundry iron two lots of 100 tons each went at \$42, furnace, for the base grade. A southern Ohio producer sold 300 tons of malleable at \$42, furnace. On Northern resale iron, however, prices range from \$3 to \$5 lower. On the 250-ton inquiry from central Ohio, noted last week, it is reported that resale iron was bought at \$38.75 for the grade asked for, or \$35.75 for the base grade. Five hundred tons of malleable for an Indianapolis melter is understood to have been taken by a Chicago house. On Southern iron \$38, Birmingham, is now considered as fairly representing the market, and we note a sale of 500 tons of Southern foundry iron to an Indiana melter at this price. Some interests are still holding their output at \$42, but no sales are reported. On Southern resale iron the lowest price reported is \$37. A Pittsburgh district producer is reported to be offering standard Bessemer iron at \$35. No transactions in basic or silveries are reported and quotation on basic below may be regarded as nominal. Prices on all grades of Globe silvery and Bessemer ferrosilicon

have been reduced \$5 per ton, making Globe 8 per cent \$55 and 10 per cent Bessemer ferrosilicon \$64.50 furnace. The melt of pig iron in this district at present is estimated to be about 60 per cent of normal, and at this rate stocks are sufficient to keep foundries running until after the first of the year.

Based on freight rates of \$4.50 from Birmingham and \$2.52 from Ironton, we quote f.o.b. Cincinnati:

Southern coke, sil. 1.75 to 2.25 (base price).....	\$42.50
Southern coke, sil. 2.25 to 2.75 (No. 2 soft).....	43.75
Ohio silvery, 8 per cent sil.....	57.52
Southern Ohio coke, sil. 1.75 to 2.25 (No. 2).....	44.52
Basic northern.....	39.52
Malleable (nominal).....	44.52

**Finished Material.**—The announcement that several of the large independents would revert to the Steel Corporation's prices on bars, shapes and plates created a good deal of interest among Cincinnati consumers. What the effect will be can hardly be known for a few days, and it is a much-discussed question whether lower prices with better deliveries will have the effect of bringing consumers into the market. At present the local market is quiet, and purchases are being made against only immediate needs. A sale of a small tonnage of bars at the Steel Corporation price of 2.35c. was reported early in the week for delivery within the next 30 days. A small tonnage of blue annealed sheets for delivery during December was taken at 5c. from a mill in the southern part of the State, and the purchaser intimated that if the mill would meet the 3.55c. price of March 21, 1919, he was prepared to cover for the first half of next year. On black sheets, quotations of 5.50c. are reported, with 6.70c. for galvanized, but very little interest is shown by consumers, as they expect to cover their needs at lower prices. The structural market is very quiet, no inquiries or awards of any size being reported. The Louisville & Nashville Railroad is reported to have purchased 2000 steel coal cars, part of the order being let to the American Car & Foundry Co. and the remainder to the Mt. Vernon Car Co. The company is expected to purchase a number of locomotives. On its inquiry for 16,000 kegs of standard railroad spikes, an award was expected on Friday. Local warehouses report a fair volume of business during the week, one jobber disposing of several car load lots. Better shipments are now being received from mills, with the result that stocks in warehouses are more complete than they have been for many months. Small bars are still hard to get, according to some jobbers, and this also applies to cold-rolled shafting. Prices are unchanged, as follows:

Iron and steel bars, 3.75c. base; small angles, 4.15c.; hoops and bands, 13 gage and lighter, 5.50c. base; structural shapes, ¼-in. and heavier, 3.85c. base; reinforcing bars, 3.82½c. base; cold rolled rounds, 1½-in. and over, 5.75c.; under 1½-in. and flats, squares and hexagons, 6.25c.; No. 10 blue annealed sheets, 6.35c. base; black sheets, 28-gage, 8c.; galvanized sheets, 28-gage, 9c.; wire nails, \$4.50 per keg base.

**Old Material.**—The scrap market is stagnant. No sales of any consequence are being made, dealers confining their efforts to cleaning up old contracts. While the price tendency is still downward, in the absence of trading no changes in quotations have been made. The Chesapeake & Ohio Railroad has offered a fair sized list. It is reported that several railroads which recently made offerings have withdrawn their lists on account of the low prices quoted.

We quote dealers' buying prices:

	Per Gross Ton
Bundled sheets.....	\$9.50 to \$10.50
Old iron rails.....	22.50 to 23.50
Relaying rails, 50 lb. and up.....	46.50 to 47.50
Rerolling steel rails.....	25.50 to 26.50
Heavy melting steel.....	15.50 to 16.50
Steel rails for melting.....	18.50 to 19.50
Car wheels.....	30.50 to 31.50

	Per Net Ton
No. 1 railroad wrought.....	17.50 to 18.50
Cast borings.....	8.50 to 9.00
Steel turnings.....	6.00 to 6.50
Railroad cast.....	22.50 to 23.50
No. 1 machinery.....	25.50 to 26.50
Burnt scrap.....	18.50 to 19.50
Iron axles.....	31.00 to 31.50
Locomotive tires (smooth inside).....	17.00 to 18.00
Pipes and flues.....	10.50 to 11.00
Malleable cast.....	18.50 to 19.00
Railroad tank and sheet.....	10.50 to 11.00

**Coke.**—The coke market shows little change as to prices. Some Wise County foundry coke was sold during the week at \$11. New River is now quoted at \$11.50, or 50c. under last week's minimum. Connells-ville coke remains unchanged at \$8 to \$8.50 for furnace and \$8.50 to \$10 for foundry.

## Boston

BOSTON, Nov. 30.

**Pig Iron.**—Rumors regarding prices at which iron is resold are plentiful, but actual transactions have been few and far between because most foundries, at the present rate of production, have enough stock to carry them into or through the first quarter, 1921. One local melter, inquiring on 5000 tons Northern first quarter iron, was offered resale at \$40, furnace base. The melter bought 400 tons. A nearby foundry bought a car of resale No. 1 Northern at \$47 delivered, or \$38.54 furnace base. Offers of other No. 1 Buffalo at \$36, furnace base, have been turned down by foundries. At least one Buffalo furnace has intimated it will accept regular business at \$45, base. These prices demonstrate the mixed condition of the market to-day. An eastern Pennsylvania furnace is offering 1921 first quarter iron at \$46 and another at \$45, base, but resale is available at \$40 or better, with few takers. No resales of Alabama iron are reported, and the two furnaces that sell the bulk of the Southern iron sold here are still nominally on a \$42 furnace base. Resale Alabama, however, is offered at less than \$38, furnace base. The market for Virginia is nominal, no actual business being reported, with offerings at \$40, furnace base on resale. A car of Richmond charcoal iron sold at \$70, or within approximately \$2 of the top 1920 price. The cost of charcoal continues excessive. Less is heard of cancellations, the furnaces refusing to honor them, but requests for deferred shipments remain in order. Generally, foundries are growing less active. Delivered resale iron prices follow:

East. Penn., sil. 2.25 to 2.75.....	\$45.31 to \$48.31
East. Penn., sil. 1.75 to 2.25.....	44.06 to 47.06
Buffalo, sil. 2.25 to 2.75.....	45.21 to 48.71
Buffalo, sil. 1.75 to 2.25.....	43.96 to 47.46
Virginia, sil. 2.25 to 2.75.....	47.83 to 49.83
Virginia, sil. 1.75 to 2.25.....	46.58 to 48.58
Alabama, sil. 2.25 to 2.75.....	49.91 to 53.91
Alabama, sil. 1.75 to 2.25.....	48.66 to 52.66

**Coke.**—The coke market is quiet, with the New England Coal & Coke Co. still asking \$19.20, delivered, where the freight does not exceed \$3.40 a ton, for spot shipments, or a \$13 Connellsville, base. The Providence Gas Co. has sold a small tonnage of capped spot coke at \$11, Connellsville base, and the former some first half, 1921, on the sliding-scale basis. But both companies are not pushing sales because of the ready market for domestic sizes. Very little Connellsville coke has been sold since last reports.

**Warehouse Business.**—Local prices on refined iron under 6 in. wide have been reduced from \$5 to \$4.65 per 100 lb., and on stock over 6 in. wide from \$6 to \$5.65, base. A majority of the houses are quoting quantity differentials again, the differential on lots of a size under 1000 lb. being 35c. per 100 lb., and on lots of a size of 1000 lb. to 1999 lb., 15c. The market on semi-finished and finished case-hardened nuts is 20 per cent lower, now being 40 per cent discount. The market for iron and steel is quiet and barely steady. A large tonnage of resale stock offered by manufacturing concerns is still hanging over the market. Stocks of bolts, nuts, rivets and washers are increasing noticeably.

Jobbers now quote: Soft steel bars, \$4.15 per 100 lb. base; flats, \$4.65 to \$5; concrete bars, \$4.15 to \$4.40; tire steel, \$5.50 to \$6; spring steel, open hearth, \$8.50; crucible, \$14; steel bands, \$5.50 to \$6.25; steel hoops, \$8; toe calk steel, \$7; cold rolled steel, \$7 to \$9.50; structural, \$4.15 to \$5.50; plates, \$4.15 to \$4.60; No. 10 blue annealed sheets, \$6.15; No. 28 black sheets, \$8.15; No. 28 galvanized sheets, \$9.50; refined iron, \$4.65 to \$5.65; best refined, \$7; Wayne, \$9; band iron, \$5.50; hoop iron, \$8; Norway iron, \$15.

**Old Material.**—The continued lack of demand and cancellation of contract shipments, together with a sale by a Worcester, Mass., machine-tool manufacturer of

1800 tons strictly No. 1 to a local dealer at 1c. per lb. have unsettled machinery cast prices. Most dealers now will not pay more than 1c. per lb. for material, which figures out about \$26, resale price, at yards here, yet \$30 is the common price quoted. Limited purchases of stove plate on eastern Pennsylvania mill contracts it noted, but the withdrawal of a Norwood consumer has weakened the market. A slump in the stove industry has checked buying from that source. The Fore River Works, Quincy, sold 580,000 lb. No. 1 heavy melting steel, in chargeable shape, at \$14.40 per ton, a good price considering the market to-day, which is mostly \$12 to \$12.50, and dull except for limited buying against eastern Pennsylvania mill contracts. Consumers do not want to pay more than \$13 or \$14 for chemical borings, but few are available at these prices. Local yard prices on old material follow:

No. 1 heavy melting steel.....	\$11.50 to \$12.50
No. 1 railroad wrought.....	19.00 to 20.00
No. 1 yard wrought.....	16.00 to 17.00
Wrought pipe (1-in. in diameter, over 2 ft. long).....	12.00 to 13.00
Machine shop turnings.....	10.00 to 11.00
Cast borings, rolling mill.....	14.00 to 15.00
Cast iron borings, chemical.....	16.00 to 17.00
Heavy axle turnings.....	10.00 to 11.00
Blast furnace borings and turnings..	8.00 to 9.00
Forged scrap.....	10.00 to 10.50
Bundled skeleton.....	10.00 to 10.50
Street car axles, steel.....	25.00 to 26.00
Car wheels.....	29.00 to 30.00
Machinery cast.....	28.00 to 30.00
No. 2 cast.....	26.00 to 27.00
Stove plate.....	19.00 to 20.00
Railroad malleable.....	23.00 to 24.00
Rerolling rails.....	21.00 to 22.00

## Birmingham

BIRMINGHAM, ALA., Nov. 30.

**Pig Iron.**—One furnace interest openly booked two orders for 300 tons each at \$38 and followed it up later in the week by booking several car lots and other small tonnages for prompt shipment at the same price. One small furnace interest and a large one each sold a car lot at \$42 base. However, all agree that, if base there is, it is one of \$38. The disposition is to cut down production. The Woodward Iron Co., at the close of the week, was on a one-furnace basis, having closed down both stacks at Vanderbilt and one at Woodward. Its operations are not confined to one stack on foundry, the basic furnace having been one of those blown out. This reduces the active stacks in Alabama to eight of the Tennessee company, four of the Sloss-Sheffield, two of the Republic Iron & Steel Co. and one each of the Gulf States Steel Co., Woodward Iron, Sheffield Iron Corporation and Alabama Co. An encouraging feature of the week was reception of fewer hold-up orders and some orders to anticipate shipments. Charcoal iron makers have not received any hold-up orders, and requests that they do receive from car wheel makers are for prompt shipment. An order for 300 tons of car wheel iron was booked during the week at the lower scale of \$54 and \$55. Here and there are indications of the coming of considerable business from the railroads. The Gulf States Steel Co. met with no trouble when it announced reduction of its bonus above the wage base from 65 to 40 per cent. Tennessee Company steel operations are up to normal, November iron and steel production alike being better than October. Iron production was 82,000 tons and finished steel 67,000 tons, an increase over October of 3000 tons.

We quote per gross ton f.o.b. Birmingham district furnaces, the Tennessee company included, as follows:

Foundry, sil. 1.75 to 2.25.....	\$38.00
Basic.....	\$37.00 to 38.00
Charcoal.....	54.00 to 55.00

**Cast Iron Pipe.**—The Anniston shops of the United States Cast Iron Pipe & Foundry Co. are down for two weeks and work was transferred to other shops. New business is confined to carload lots for prompt movement. Sanitary shops are in the stagnant stage. Jobbers have not taken advantage of some lower price offers on the part of shops with stocks on hand. Water



and gas pipe quotations now are \$75 for 4 in. and \$70 for 6 in. and upward.

**Coal and Coke.**—Alabama production is running around 280,000 tons a week with ample supply of steam coal for all and decreasing demand for low grades. More men are offering for work in the mine field than there are positions for. New prices have been made on coke. Standard spot coke for foundry purposes may be had at from \$10.50 to \$12.50 and furnace coke \$1 to \$2 lower.

**Old Material.**—The scrap market has fallen to pieces and practically nothing is being done pending the stabilization of the iron and steel markets and resumption of activities.

We quote per gross ton f.o.b. Birmingham district yards, prices to consumers, as follows:

Old steel rails.....	\$17.00 to \$18.00
No. 1 heavy steel.....	16.00 to 17.00
No. 1 cast.....	27.00 to 28.00
Car wheels.....	27.00 to 28.00
Tramcar wheels.....	25.00 to 26.00
No. 1 wrought.....	21.00 to 22.00
Stove plate.....	14.00 to 15.00
Cast iron borings.....	7.00 to 8.00
Machine shop turnings.....	7.00 to 8.00

## New York

NEW YORK, Nov. 30.

**Pig Iron.**—Weakness of resale iron has more plainly developed from week to week. This fact is illustrated particularly in the case of Buffalo irons on which the usual quotation is now \$38, base, compared with the recent quotation of \$40, while \$41, furnace, is the usual resale quotation on eastern Pennsylvania. While most foundries are well supplied with iron, there seems to be no question that some of the leading melters will soon be compelled to come into the market, but they are in no hurry to do so, and no one is disposed to blame them for waiting while the resale prices continue to recede. A leading coke producer in the Connellsville region which has made contracts at \$15 for foundry coke is now selling at \$10 and is revising its contracts accordingly. Some furnace operators say that if they were able to contract for furnace coke at \$6 they could sell iron on a basis of \$34, but that they would blow out rather than sell at lower prices. A prominent furnace operator, pointing out what he considered the impossibility of adopting the suggestion made in some quarters of reducing pig iron prices to the Industrial Board schedule of March 21, 1919, which made the price of basic pig iron \$25.75, said that the adoption of that price would be absolutely ruinous on account of the heavy increase in freight rates on ore and other materials, as well as in wages.

We quote for delivery in the New York district as follows, adding to furnace prices \$2.52 freight from eastern Pennsylvania, \$5.46 from Buffalo and \$6.16 from Virginia:

East. Pa., No. 1 fdy., sil. 2.75 to 3.25.	\$45.52 to \$46.52
East. Pa., No. 2X fdy., sil. 2.25 to 2.75.	44.25 to 45.25
East. Pa., No. 2 fdy., sil. 1.75 to 2.25.	43.52 to 44.52
Buffalo, sil. 1.75 to 2.25.....	43.46
No. 2 Virginia, sil. 1.75 to 2.25.....	46.16 to 47.16

**Ferroalloys.**—The market for ferromanganese and spiegeleisen is absolutely stagnant, there being no inquiries or sales. American producers are offering ferromanganese at \$150, delivered, but there has been no change in the quotation of British producers of \$170, seaboard, largely because there is no competition. Spiegeleisen, 20 per cent, is quoted nominal at \$72.50, furnace, with resale alloy obtainable at a considerable concession. The manganese ore market is also unchanged and nominal at 45c. to 50c. per unit, seaboard. There is no demand for 50 per cent ferrosilicon which is quoted unchanged at around \$80, delivered. Quotations for lump ferrotungsten, guaranteed, are 59c. per lb. of contained tungsten. Ferrovandium is quoted at \$6.50 to \$7 per lb. of contained vanadium in wholesale lots for early delivery, but these are nominal, the alloy being exceedingly scarce. Ferrocobaltititanium, 15 to 18 per cent, is selling at \$200 per net ton in carload lots,

at \$220 per ton in lots between one ton and a carload, and at \$250 per ton in lots less than a ton, f.o.b. Suspension Bridge, N. Y.

**Warehouse Business.**—Although no further change has been made in prices this week, it is generally felt that the recent reductions of the Jones & Laughlin Steel Co. and other independent mills will result in action by warehouses in New York. Waverly warehouse of the Carnegie Steel Co. was closed for inventory, Nov. 26 and 27. Waverly now has in stock 3/4-in. channels and reports its stock better than for several weeks. Dealers in small lots of a few sheets have reduced their quotations on blue annealed 90c. per 100 lb., black and galvanized sheets, 50c. per 100 lb. Tin plates, Grade A and AAA are down \$2 per box and primes and wasters are off \$1. The situation in brass and copper is unchanged. We quote prices on page 1526.

**High Speed Steel.**—A slight increase in small orders is noted by most producers. The prevailing quotation is nominally \$1.25 per lb. for 18 per cent tungsten high speed steel with fair sized orders at much less than this price.

**Finished Iron and Steel.**—One set of prices now holds for bars, plates and shapes, for while the independent steel companies have not generally made any announcement, it is clear that purchases from mills for early shipment can now be placed at the price levels of March 21, 1919, the price maintained since that time by the United States Steel Corporation. It cannot be said that an increase of business has resulted, although the number of inquiries has increased somewhat. Regarded widely as a stabilizing factor, it is yet not surprising that some large buyers hold that the present price condition does not mean that lower levels will not be reached before buying in volume ensues. Necessity for buying with these individuals not being a fact at the moment, the opinion is not under test. Against this view is speculation that before long a Steel Corporation rail price will be announced. The railroads will not be surprised to have this \$5 higher than the present level and would, it is claimed, accept the figure without question. It seems clear that the options which the roads have placed with the mills exceed by 20 per cent the purchases of recent years and may indeed amount to a total approaching the years of largest rail consumption, or in excess of 3,500,000 tons. The Colorado rail mill is said to have accepted orders on the basis of the price which the Steel Corporation will name, but other rail makers are understood to be standing out for \$57 per gross ton for the open-hearth rail. Contracts for tin plate have been made with a price-to-be-named-later clause. Railroad purchasing departments do not hold forth any hope of buying of structural steel or rolling stock in volume until after the first of the year, and some put off the day when their purchase may be expected until spring. Inquiries for railroad cars are few, the only one of note in the past week coming from the Northern Pacific for 1000 box cars. The Fort Pitt Bridge Works will fabricate 600 tons of bridgework for the Baltimore & Ohio Railroad and the Lehigh Structural Steel Co. has the contract for 250 tons for the Canadian Adamant Plaster Co., New Haven, Conn. The Fidelity & Guaranty Bank Building, Baltimore, has now been placed with the McClintic-Marshall Co. Prices of bar iron appear to be weakening; an attractive inquiry has brought a reduction of \$10 per ton, but prices remain nominally as they have been. Bolts and nuts are irregular; makers who have been getting top prices have made reductions extending from 5 to 15 per cent in the different lines, but as yet these do not represent the lowest quotations.

We quote for mill shipments, New York, as follows: Soft steel bars, 2.73c.; plates, 3.03c.; shapes, 2.83c.; bar iron, flats, wider than 6 in., 5.38c., with half extras; light rounds, squares and flats, 5.88c., with full extras, and other sizes, 4.88c., with half extras.

**Cast Iron Pipe.**—Business has slowed down, and many makers could handle considerably more orders. The Warren Foundry & Machine Co. was awarded the

contract for 100 tons of 8-in. pipe for the city of East Orange, N. J. There is still no talk of price reductions. We quote, f.o.b. New York, 6-in. and larger, \$77.22; 4-in., \$87.22; 3-in., \$97.22, with \$2 additional for Class A and gas pipe.

**Old Material.**—The practice has become prevalent of having all orders shipped within 10 days because of the uncertainty of the market. Further price recessions are recorded this week. A spirit of pessimism pervades the trade. Brokers and dealers do not mind so much the lowering of prices, but are uneasy because of the absence of inquiries and sales. That the bottom of the market is not very far away is indicated by a comparison with pre-war prices. In 1914 heavy melting steel was at one time shipped as low as \$9.50, delivered to Coatesville, Pa., equivalent to \$7, New York. Brokers maintain this level cannot be reached these days because of the higher freight rates, labor and other factors.

Buying prices per gross ton, New York, follow:

Heavy melting steel	\$12.50 to \$13.50
Revolving rails	22.50 to 23.50
Relaying rails, nominal	50.00 to 53.00
Steel car axles	21.00 to 22.00
Iron car axles	35.50 to 36.50
No. 1 railroad wrought	19.00 to 20.00
Wrought iron track	16.00 to 17.00
Forge fire	9.00 to 10.00
No. 1 yard wrought long	17.00 to 18.00
Light iron	7.00 to 8.00
Cast borings (clean)	13.50 to 14.50
Machine-shop turnings	10.00 to 11.00
Mixed borings and turnings	8.00 to 9.00
Iron and steel pipe (1 in. diam. not under 2 ft. long)	12.50 to 13.00
Stove plate	18.00 to 19.00
Locomotive grate bars	16.00 to 17.00
Malleable cast (railroad)	16.50 to 17.50
Old car wheels	27.00 to 28.00

Prices which dealers in New York and Brooklyn are quoting to local foundries, per gross ton:

No. 1 machinery cast	\$32.50 to \$33.50
No. 1 heavy cast (columns, building materials, etc.), cupola size	31.50 to 32.50
No. 1 heavy cast, not cupola size	24.00 to 25.00
No. 2 cast (radiators, cast boilers, etc.)	25.00 to 26.00

## Philadelphia

PHILADELPHIA, Nov. 30.

Eastern independent steel companies are showing no haste to meet the Steel Corporation prices on plates, shapes and bars, as was done last week by several of the independents in the Pittsburgh-Youngstown district. Without doubt they will do so whenever an attractive tonnage comes up for quotations. On the present run of small lots it is the intention of some of them to continue to quote prices above those of the Steel Corporation. Some of the makers of plates and shapes, whose plants are not self-contained, say that 2.45c. on shapes and 2.65c. on plates are below their cost line, and it is probable that they will prefer to keep their plants in whole or partial idleness until manufacturing costs come down proportionately. The announcement of reduced prices by some of the independents has brought out very little business. The whole market is extremely quiet and marked by declining prices in pig iron, coke, bar iron, bolts, nuts, rivets and spikes and old material.

**Pig Iron.**—In an inactive market prices of pig iron continue to decline. Sales are few and consist usually of only a carload or two. Resale iron predominates, few furnaces showing a disposition to urge buying. Consumers take little interest, even when relatively low prices are quoted. A consumer who was quoted \$33, Pittsburgh, on an inquiry for basic iron decided not to buy when it became known that some of the independent steel companies had reduced their prices on plates, shapes and bars to the level of March 21, 1919. He argued from this that pig iron prices must also recede to the figures in the so-called Industrial Board schedule, which were \$25.75 for basic and \$26.75 for foundry iron, Valley furnace. With this position pig iron sellers naturally do not agree. They point out that these prices were not at that time satisfactory to the furnaces, many of which went out of blast, and that they were operating at that time on \$4 coke,

whereas coke to-day costs from \$6 to \$7. Resale foundry iron is to be had from eastern Pennsylvania and Virginia furnaces at from \$38 to \$40, furnace. A sale of a few carloads of off-grade foundry iron was made by an eastern Pennsylvania furnace at \$35.

The following quotations are for iron delivered in consumers' yards in Philadelphia or vicinity, except those for low phosphorus iron, which are f.o.b. furnace.

East. Pa. No. 2 plain, 1.75 to 2.25 sil.	\$39.54 to \$41.54
East. Pa. No. 2X, 2.25 to 2.75 sil.	40.79 to 42.79
Virginia No. 2 plain, 1.75 to 2.25 sil.	43.74 to 50.74
Virginia No. 2X, 2.25 to 2.75 sil.	44.99 to 51.99
Basic deliv. Eastern Pa.	38.46 to 41.16
Gray forge	41.90
Standard low phos. (f.o.b. furnace)	60.00
Malleable	45.40
Copper bearing low phos. (f.o.b. furnace)	57.00

**Coke.**—An Eastern blast furnace has bought coke for prompt shipment at \$6, Connellsville.

**Ferroalloys.**—A break in the price of spiegeleisen to \$60, furnace, represents a drop of more than \$10 a ton from the prices which some producers have been quoting. Ferromanganese is nominally held by makers at \$150, Atlantic seaboard, but resale lots can be bought at least \$15 below this price.

**Semi-Finished Steel.**—Billets are quoted at \$50 to \$55 for open-hearth rerolling and \$60 to \$65 for forging quality by Eastern makers, the freight rate from Pittsburgh to Philadelphia, \$5.74, being added. Sheet bars are now quoted by a Youngstown maker at \$52, Pittsburgh.

**Plates.**—Some of the Eastern plate mills remain in whole or partial idleness owing to lack of orders. The naming of 2.65c., Pittsburgh, by some of the Pittsburgh and Youngstown mills has not stimulated any business in this district. Most of the users of plates have sufficient stocks on hand for any work that they still have ahead of them. Eastern mills are in no hurry to mark down their price to 2.65c., but probably will do so if any attractive inquiries should develop. On current inquiries for small lots, prices \$2 to \$3 above the 2.65c. price are being quoted by a few makers. We now quote sheared plates, ¼ in. and heavier, at 2.65c., Pittsburgh.

**Structural Material.**—Only one of the Pittsburgh-Youngstown companies which have reduced prices to the Steel Corporation level makes shapes of structural size, that being the Jones & Laughlin Steel Co. Therefore the Eastern mills do not feel the necessity at present to bring their quotations down to that figure. On attractive lots, they probably would do so, but the inquiries for many weeks have been for such small tonnages that a premium of a few dollars a ton above the 2.45c. price will probably be asked on business of this character. We quote plain material at 2.45c., Pittsburgh.

**Bars.**—On merchant steel bars a reduction to 2.35c., Pittsburgh, will probably be made soon by all of the independents in the East, but for the time being some of them are adhering to 3c. In some cases this is doubtless being done to protect orders at that price still unshipped. A company which makes mostly special bars has no immediate intention of adopting the 2.35c. base price. Bar iron is down to 4c., Pittsburgh, a decline of \$10 a ton from its high price. On some sizes 4c. could probably be shaded. The Reading Iron Co. has resumed operations at its plant, which has been closed by strike for several months. Puddlers' wages were adjusted on the basis of \$16.25 per ton. We quote steel bars at 2.35c. and bar iron at 4c., Pittsburgh.

**Sheets.**—Prices on sheets are somewhat at variance. One company in the East is reported to be meeting the quotations of the American Sheet & Tin Plate Co. Another Eastern company, which makes only blue annealed sheets, has not quoted below 4.50c., Pittsburgh. Quotations of other independent companies range as follows: No 10 blue annealed, 3.90c. to 4.05c.; No. 28 black, 4.85c. to 5c.; No. 28 galvanized, 6c. to 6.20c., all Pittsburgh base. An Eastern maker of tin plate is quoting \$7 per base box.

**Bolts, Nuts and Rivets.**—Reductions of more than 15 per cent have been made by makers of bolts, nuts and



rivets. The new discounts are as follows:

Machine bolts,  $\frac{3}{8}$  x 4 in. and smaller, hot pressed nuts, rolled threads, 40, 10 and 5 per cent off; cut threads, 40 and 5 per cent off; large machine bolts, 30 and 10 per cent off; machine bolts, cold punched nuts,  $\frac{3}{8}$  x 4 in. and smaller, 35 per cent off; larger sizes, 25 per cent off; carriage bolts,  $\frac{3}{8}$  x 6 in. and smaller, rolled threads, 40 and 5 per cent off; cut threads, 30 and 10 per cent off; larger sizes, 30 per cent off; lag screws, 50 per cent off; nuts, hot pressed, blank, 1.50c. off; tapped, 1c. off. There is no change on cold punched nuts, which remain at list plus 1c. per lb. The new price on boiler rivets is \$4.85 and on structural rivets, \$4.75 per 100 lb., Pittsburgh; small tank rivets, 7/16 in. and smaller, 50 per cent off; track bolts,  $\frac{3}{8}$  in. and smaller, 7c. per lb., base; larger diameter, 6c. per lb., base. Contracts are now being made for four months, December and first quarter of next year.

**Railroad Spikes.**—Reductions in prices have been made as follows: 9/16 in. and larger, 4c. per lb., base;  $\frac{1}{2}$  in., 4.25c.; 7/16 and  $\frac{3}{8}$  in., 5c., all f.o.b. Pittsburgh.

**Old Material.**—Scrap prices continue to decline. There are very few transactions and the prices quoted below are largely nominal, representing offerings by dealers rather than sales to consumers. We quote for delivery to consuming points in this district as follows:

No. 1 heavy melting steel.....	\$17.00 to \$18.00
Steel rails, rerolling .....	25.00 to 26.00
No. 1 low phos., heavy 0.04 and under..	26.00 to 28.00
Car wheels .....	30.00 to 32.00
No. 1 railroad wrought.....	23.00 to 24.00
No. 1 yard wrought.....	19.00 to 20.00
No. 1 forge fire .....	14.50 to 15.00
Bundled skeleton .....	14.50 to 15.00
No. 1 busheling .....	18.00 to 20.00
No. 2 busheling .....	15.00 to 16.00
Turnings (short shoveling grade for blast furnace use) .....	14.50 to 15.00
Mixed borings and turnings (for blast furnace use) .....	13.50
Machine-shop turnings (for rolling mill and steel works use).....	15.50 to 16.50
Heavy axle turnings (or equivalent) ..	16.00 to 17.00
Cast borings (for rolling mills).....	20.00 to 21.00
Cast borings (for chemical plants)....	21.50 to 22.50
No. 1 cast .....	31.00 to 32.00
Railroad grate bars .....	23.00 to 24.00
Stove plate (for steel plant use).....	23.00 to 23.50
Railroad malleable .....	25.00 to 26.00
Wrought iron and soft steel pipes and tubes (new specifications)....	18.00 to 19.00
Iron car axles.....	32.00 to 33.00
Steel car axles .....	30.00 to 31.00

## San Francisco

SAN FRANCISCO, Nov. 23.

**Pig Iron.**—The market for imported pig shows no change. Domestic pig is weak. With a further slackening of demand, prices are quoted the same, but concessions are being made notwithstanding smaller stocks. Buyers seem to be holding off in anticipation of further price reductions. The coke market is uncertain. There is considerably less demand and the price has fallen from \$33.50 to \$32.50 a net ton for foundry coke. This figure is based on a \$14.50, oven, price, plus \$18 transportation to San Francisco.

**Bars.**—Both supply and demand for plates and bars continue to fall off. The price situation remains unchanged. Deliveries on old orders are hard to get. Jobbers are buying only to replenish stocks. Local mills are fairly busy.

**Pipe.**—Stocks of welded pipe are very low, but old prices prevail. Cast-iron pipe is quoted at the same figure, with a quiet market, but indications point to an early decline in price. The town of Brea, Cal., is receiving bids this week for 5200 feet of 8-in. cast-iron pipe. The Los Angeles Board of Public Works opened bids Nov. 22 for 750 tons of flange and flexible joint pipe.

**Scrap.**—Scrap is still going down, the last quotation being \$20 for heavy melting, f.o.b. California mills, as compared with \$22.50 earlier in the month. The market is quiet, with further declines expected.

## St. Louis

ST. LOUIS, Nov. 29.

**Pig Iron.**—Aside from a little buying of small lots for early delivery and an inquiry for 500 tons of malleable for December shipment the pig iron market was lifeless. Melters have on their yards or under contract all that they need for the present.

**Coke.**—Some small lots of coke were sold during the week and the price range was from \$9 to \$11 per ton for early or prompt shipment, although on contracts for next year \$11 was the figure. No real business appeared, however, during the week.

**Finished Iron and Steel.**—No changes in quotations were made during the past week on finished products, although the news that the independents had come down to the Industrial Board basis so long occupied by the chief interest that there was some speculation as to what might be done as a result of the independents' action. No business of special moment was transacted during the week. For stock out of warehouse we quote as follows:

Soft steel bars, 3.57 $\frac{1}{2}$ c.; iron bars, 4.07 $\frac{1}{2}$ c.; structural material, 3.67 $\frac{1}{2}$ c.; tank plates, 3.87 $\frac{1}{2}$ c.; No. 10 blue annealed sheets, 6.22 $\frac{1}{2}$ c.; No. 28 black sheets, cold rolled, one pass, 8.20c.; No. 28 galvanized sheets, black sheet gage, 9.70c.

**Old Material.**—The scrap market shows no business of consequence, the only transactions being in the usual small lots that are always wanted for special needs or purposes. These are usually for quick delivery and are handled by the dealer happening to have the scrap close at hand. No trading is going on among the dealers and no railroad lists have come out, although the usual monthly issue is expected within the next ten days.

We quote dealers' prices, f.o.b. consumers' works, St. Louis industrial district, as follows:

Per Gross Ton	
Old iron rails.....	\$24.00 to \$24.50
Old steel rails, rerolling.....	18.50 to 19.00
Old steel rails, less than 3 ft.....	17.00 to 17.50
Relaying rails, standard section, subject to inspection.....	40.00 to 45.00
Old car wheels.....	32.00 to 32.50
No. 1 railroad heavy melting steel scrap .....	16.00 to 16.50
Heavy shoveling steel.....	15.00 to 15.50
Ordinary shoveling steel.....	14.00 to 14.50
Frogs, switches and guards cut apart ..	16.00 to 16.50
Ordinary bundled sheet.....	9.50 to 10.00
Per Net Ton	
Heavy axle and tire turnings.....	9.50 to 10.00
Iron angle bars.....	24.00 to 24.50
Steel angle bars.....	15.00 to 15.50
Iron car axles.....	34.00 to 34.50
Steel car axles.....	23.00 to 23.50
Wrought arch bars and transoms.....	25.00 to 25.50
No. 1 railroad wrought.....	17.00 to 17.50
No. 2 railroad wrought.....	16.00 to 16.50
Railroad springs .....	15.00 to 15.50
Steel couplers and knuckles.....	16.00 to 16.50
Locomotive tires, 42 inches and over, smooth inside .....	14.00 to 14.50
No. 1 dealers' forge.....	13.00 to 13.50
Cast iron borings.....	8.00 to 8.50
No. 1 busheling.....	16.00 to 16.50
No. 1 boilers, cut to sheets and rings ..	11.00 to 11.50
No. 1 railroad cast scrap .....	22.00 to 22.50
Stove plate and light cast scrap.....	18.50 to 19.00
Railroad malleable .....	17.00 to 17.50
Agricultural malleable .....	16.00 to 16.50
Pipes and flues.....	11.50 to 12.00
Railroad sheet and tank scrap.....	10.50 to 11.00
Railroad grate bars.....	15.00 to 15.50
Machine shop turnings.....	6.00 to 6.50
Country mixed scrap.....	9.50 to 10.00
Uncut railroad mixed scrap.....	10.00 to 10.50
Horseshoes .....	17.50 to 18.00
Railroad brake shoes.....	15.00 to 15.50

## Car Surplus in Some Sections

WASHINGTON, Nov. 30.—Increasing railroad efficiency coupled with slackening of demand is producing car surpluses in some sections of the country. Figures of the Car Service Division of the American Railway Association show that for the week ended Nov. 15 the total number of surplus cars in excess of current requisitions amounted to 19,865, an increase of 7832 over the previous week. This surplus was principally located in the South and Central West.

While surpluses developed in particular sections the net figures covering the entire country show a decrease in the shortage of cars. The average daily shortage for the week ended Nov. 15 was 35,356 cars, or a decrease of 4332 compared with the preceding week.



## British Prices Tend Lower

### Continental Steel Competition Keen—Export Prices Reduced—Minimum Tin Plate Price Uncertain

(By Cable)

LONDON, ENGLAND, Nov. 29.

The tendency in the Cleveland pig iron market is toward more normal conditions. The idea of an advance has now been abandoned and makers have agreed not to increase prices. The allocations scheme for Scotland will be discarded at the end of the month, makers fearing foreign competition. Belgian basic iron is arriving at a price 15s. below Cleveland domestic prices. Makers of hematite iron are prepared to book new business for next year but buyers are shy.

The foreign iron ore market is quiet and Bilbao rubio is quoted at 52s. c.i.f.

Scotch steel makers have reduced domestic trade prices and English works have lowered export quotations considerably because of keen Continental competition. Continental 2-in. to 4-in. billets are being offered at £14 delivered, Midlands Skelp No. 20 gage has sold at £22 10s. delivered Birmingham. Merchant bars have sold at £14 f.o.b.

The tin plate market is uncertain and the minimum price arranged by conference is not universally agreed to and a further meeting is to be held Dec. 21. Smaller works state that they intend to close and some have already issued notices to their men expiring early in December. Merchants are talking of 38s. basis f.o.b. as a price for first quarter delivery.

Ferromanganese has been reduced to £35 per ton for domestic use and to £38 for export.

We quote per gross ton except when otherwise stated, f.o.b. maker's works, with American equivalent figured at \$3.48 for £1, as follows:

Ship plates .....	£26 0 to £30 0	\$90.48 to \$104.40
Boiler plates .....	30 0 to 35 0	104.40 to 121.80
Tees .....	25 0 to 27 0	87.00 to 93.96
Channels .....	24 5 to 26 5	84.39 to 91.35
Beams .....	24 0 to 26 0	83.52 to 90.48
Round bars, ¾ to 3 in.	26 10 to 29 10	90.48 to 102.66
Rails, 60 lb. and up.	25 0 to 27 0	87.00 to 93.96
Billets .....	17 0 to 17 10	59.16 to 60.90
Sheet and tin plate bars		
Welsh .....	18 0 to 18 10	62.64 to 64.38
Galvanized sheets, 24 g.	33 0	114.84
Black sheets, 24 g.	34 10	130.06
Tin plate base box.	1 19*	6.78
Steel hoops .....	34 0	118.32
Cleveland basic iron.	11 15	40.89
West Coast hematite.	15 15	54.81
Cleveland No. 3 foundry.	11 5	39.15
Ferromanganese .....	35 0 to 38 0	121.80 to 132.24
Coke .....	3 2¾	10.91

\*Prompt delivery; forward, 42s. (\$7.30).

### Buyers Expecting Lower Prices—Continental Competition—Effect of Coal Strike

LONDON, ENGLAND, Nov. 15.—Now that the coal strike is over and work has been resumed in the collieries there is time to look round and see what the effects have been. Put in figures the loss in coal output is estimated at from 13,000,000 to 14,000,000 tons while the loss in wages to miners is estimated at from £14,000,000 to £15,000,000. The loss in wages is the miners' affair, but the fall in output of coal is a serious matter for the country. The Board of Trade returns for October do not fully reflect the effect, but it is noted that the exports of coal during the month showed a reduction of 1,312,000 tons or in value £2,408,000. The weakening of the country's purchasing power is thus illustrated. It is most unfortunate as, apart altogether from the strike, there is a general feeling of pessimism in all markets. Ultimate consumers all round are reluctant to buy in the general expectations that prices of nearly every commodity are going to be lower, and this, of course, works its way up through all phases of

industry. The causes of the depression are vaguely defined by the man in the street as "finance," although he may not exactly understand what that means. He is content, however, to buy as little as possible, and the result in the aggregate is flat trade, and depression in all markets. This is added to by the recent drops in the rates of dollar exchange as well as the similar movement in the rates of exchange of the various Continental countries which restrict their buying power, and at the same time increase their selling power, so that the markets for commodities which can be imported from the Continent are all feeling the draught.

As regards the iron and steel trade itself not much business has been moving in pig iron, although in certain quarters buyers seem to be willing enough to pay the high prices which were established before the strike. Generally speaking, however, blast furnaces have not yet got properly going again and, although there has been a substantial amount of export inquiry, it has been impossible yet to deal with this. Makers of pig iron are, however, realizing the necessity of putting forward a serious effort to retain these overseas markets, as owing to the cheaper offerings of Continental material, the longer makers here refuse to quote for export business, the more difficult will it be to regain these markets. In the meantime Belgian and French material is finding its way in here, a further parcel of 1000 tons of basic iron having recently arrived from Belgium. As to the lower qualities of Cleveland iron, there are plentiful supplies of these, but they do not seem to be wanted.

The finished iron and steel trade is still more or less in a state of suspense, and the general attitude is one of waiting, owing to the belief that a readjustment of prices is imminent. There have been numerous reports of low prices at which Continental material has been sold, and the effect of the reports of these dealings, whether accurate or not, is considerable. Belgian prices have during the past few months had a big fall, this is partly owing to the declining exchange, but it is a competition which is causing manufacturers here seriously to reflect. For some time there has been labor trouble in the coal mining industry in Belgium, but this seems to be over. A stoppage is now threatened in France, the Loire miners having unanimously adopted a strike resolution.

Reports of combines of various descriptions continue to be rife, a big merger is now coming off (dating from Jan 1, 1921) in South Wales involving the amalgamation of Partridge, Jones & Co., colliery owners (one of the most prosperous Welsh colliery enterprises having a share capital of £300,000), the Crumlin Valley Collieries, and a number of steel, tin plate and galvanized sheet works including:

Pontnewydd Steel Sheet & Galvanizing Works.  
Pontypool Works.  
Monmouthshire Steel & Tinplate Works.  
Caerleon Steel & Tinplate Works.  
Waterloo Tinplate Works, and  
Henry White & Co.

This concern will have an authorized capital of £3,000,000.

Although they are as yet unconfirmed, there have also been rumors about of negotiations being in progress for some form of fusion of interest between Cammell, Laird & Co., Sheffield; Wm. Beardmore & Co., Glasgow, and Wilsons & Clyde Coal Co., Glasgow.

A photographic method of detecting changes in a complicated group of objects is the subject of scientific paper 392, issued by the Bureau of Standards, Washington, D. C. The method consists of the following procedure: Two negatives of a group of objects, as, for instance, a new building or a group of new buildings in process of construction are made, one before an expected change, the other afterward. A positive is printed from one of the negatives, is superposed in register upon the other negative and the combination viewed against a light source. Portions of the combination corresponding to unchanged portions of subject will be of nearly uniform opacity, while changes will be revealed by marked variations in opacity.

## EIGHT-HOUR DAY IN FRANCE

### Decree of Aug. 15, 1920, Granting Overtime— History of the Case

PARIS, FRANCE, Oct. 27.—Readers of THE IRON AGE may not have forgotten that the law of April 23, 1919, which enacted the 8-hr. day (or the 48-hr. week) for all industries, provided that decrees should be issued for each industry to carry out the law, and that as early as April 17 an agreement, completed on May 24, had been signed by the Metal-workers' Federation and the largest employers' federation, the Union of the Iron, Steel and Engineering Industries, a decree remaining to be issued for the metal-working industry at large.

It was not until Aug. 15, 1920, that is to say, about 15 months later, that the agreement was finally concluded. The policy of the workmen's federation was to cause the agreement to become the decree with as few alterations as possible. They had to contend with those employers who from the outset had opposed the agreement of April 17 and most of whom constituted the powerful syndicate of boilermakers, founders and operators of metal-working plants.

In October the syndicate sent to the minister of labor a protest against the rough draft of the decree and proposed several alterations; some weeks later, having changed their president (which meant a somewhat new policy), they adhered to the union on condition that the union would back their point of view concerning the exemptions to the 8-hr. day for urgent work (work in cases of national emergency being dealt with otherwise) and help their endeavor to have the full carrying out of the law postponed for a few years. On

account of the decided opposition of the men, the union was obliged to give up this second item, and the discussion went on on the question of the exemptions, the men maintaining the number of 100 hr. overtime a year, as provided by the agreement of April, 1919, while the employers' union proposed (March 27) 200 to 250 hr. a year during three years.

A few weeks later, the Paris metal workers took part, against the advice of their federation, in the great labor trouble initiated by the strike of the railroad workers. To speak only of the metal workers, the result of the movement was very bad, and the position of the federation against the requirements of the employers' union was so weakened that the minister of labor thought he could propose to the men to accept to work 150 hr. overtime a year as a rule, and during the years 1920, 1921 and 1922, 50 hr. more a year, which would be allowed by the factory inspector after taking advice of the employers' and men's organizations. The men said that in this new drafting they clearly perceived an idea of revenge of the employers against the defeated strikers.

However, on account of the very strong opposition of the men the minister gave way somewhat, and the employers also; and the decree issued on Aug. 15 maintained the 100 hr. a year rule. It is true that on the other hand it allowed 50 hr. a year more. In both cases the permission to work overtime was to be granted by the minister of labor when there is an extraordinary increase of work and when the minister in whose jurisdiction this work is attests that such work is performed in the national interest. The men find sufficient guarantees in this clause, for they rely on the power of a federation 200,000 members strong to prevent a minister's misusing the rights given him by the decree.

A. GARNIAULT.

### The Benefits of Immigration to Industry

In speaking recently on immigration before the Philadelphia Chamber of Commerce William H. Barr, president Inter-racial Council, New York, and president National Founders' Association, said: "If there is any danger to America, it has not been from the immigration of the foreign born to this country. The danger has been from the departure of foreign born, from the lack of sufficient numbers of such workmen in the industries that depend upon foreign born for labor, from the restrictionist attitude of some of our people and from the indifference of American business."

Mr. Barr said that before the war there was an annual net gain of immigrants over emigrants of 300,000, but for the fiscal year ended last June 30, this net gain was only 9877. A large number of those now coming are old men, women and children, who will not compete with American labor. Even the incoming able-bodied males are mostly unskilled and do not compete with American labor, which is chiefly skilled. The foreign-born labor supply adjusts itself automatically—when there is an oversupply of native labor the immigration is reduced, and vice versa.

The speaker advocated: "We should have a service of distribution functioning both in Europe and in America. Before embarking on the other side, the immigrant should be informed where the best opportunities exist in this country and every effort should be made to scatter the immigrants throughout the United States, so as to insure that all localities requiring immigrant workers shall get the benefit of their labor. Incidentally, this would have the effect of checking the growth of the racial communities that have grown up because of our neglect in the past to provide adequate Federal machinery for distribution."

"I would suggest that our Department of Labor send representatives to Europe to select the kind of immigration that is most assimilable and that best suits the industrial requirements of this country. At present our immigration machinery is inadequate. It has no facilities abroad; it depends upon the consular offices for whatever investigations into immigrant applications for passports are necessary. The original purpose

of those consulates—to gather business facts of interest to our business men—is being lost sight of."

The speaker told of the work of the Inter-racial Council, a little over a year old, composed of over 1100 industrial establishments and conference groups from among 32 races. They have directed their efforts through the foreign language press with news and advertisements relating to the impracticability of Bolshevik theories and the real meaning of American democracy; the English language press to eliminate racial antagonisms, which are fertile soil for the seed of Bolshevism; through individual plants by surveys by experts who know the races and their psychology.

In regard to the literacy test, he said: "It may keep out the illiterates, who may be, and often are, very intelligent; it does not keep out the potential crooks and revolutionary agitators, who, as a rule, can read and write in several languages."

### Orders for Seattle Plants

The Pacific Car & Foundry Co., Seattle, has received an order for 10 of its standard type of logging cars for shipment to Cadawallader & Gibson at Manila, P. I., and another order for 8 for delivery to the Negros-Phillipine Lumber Co., also at Manila. The Pacific Car & Foundry Co. has completed at its Renton shops the rebuilding of 300 cars for the Chicago, Milwaukee & St. Paul and has very little work on hand, so that the company has recently laid off about 400 men at the Renton shops. The recent inquiry of the Great Northern for 500 refrigerator cars has not yet been placed, but it is said this order is almost certain to be placed with the interest. Official advices were received in Seattle this week that the Northern Pacific would soon come in the market for a large number of box cars, and also for other equipment.

American Federation of Labor is reported to be conducting a survey among iron and steel workers in the Mahoning and Shenango Valleys preparatory to another organization campaign. The more conservative organizers who were active in the district during the steel strike have been sent to the Valleys.



# Prices Finished Iron and Steel, f.o.b. Pittsburgh

## Freight Rates

Freight rates from Pittsburgh on finished iron and steel products, in carload lots, to points named, per 100 lb. are as follows:

Philadelphia .....	\$0.35	St. Paul .....	0.695
Baltimore .....	0.335	Omaha .....	0.815
New York .....	0.33	Omaha (pipe) .....	0.78
Boston .....	0.415	Denver .....	1.35
Buffalo .....	0.295	Denver (wire products) .....	1.415
Cleveland .....	0.24	Pacific Coast .....	1.665
Cincinnati .....	0.33	Pacific Coast, ship	
Indianapolis .....	0.345	plates .....	1.335
Chicago .....	0.38	Birmingham .....	0.765
St. Louis .....	0.475	Jacksonville, all rail .....	0.555
Kansas City .....	0.815	Jacksonville, rail and	
Kansas City (pipe) .....	0.78	water .....	0.46
		New Orleans .....	0.515

The minimum carload to most of the foregoing points is 36,000 lb. To Denver the minimum loading is 40,000 lb. while to the Pacific Coast on all iron and steel products, except structural material, the minimum is 80,000 lb. On the latter item the rate applies to a minimum of 50,000 lb. and there is an extra charge of 9c. per 100 lb. on carloads of a minimum of 40,000 lb. On shipments of wrought iron and steel pipe to Kansas City, St. Paul, Omaha and Denver, the minimum carload is 46,000 lb. On iron and steel items not noted above the rates vary somewhat and are given in detail in the regular railroad tariffs.

## Structural Material

I-beams, 3 to 15 in.; channels, 3 to 15 in., angles, 3 to 6 in., on one or both legs, 1/4 in. thick and over, and zees, structural sizes, 2.45c.

## Wire Products

Wire nails, \$3.25 to \$4.25 base per keg; galvanized, 1 in. and longer, including large-head barbed roofing nails, taking an advance over this price of \$1.50 to \$2 and shorter than 1 in., \$2 to \$2.50. Bright Bessemer and basic wire, \$3.25 to \$3.75 per 100 lb.; annealed fence wire, Nos. 6 to 9, \$3.25 as quoted by the American Steel & Wire Co., and No. 8 and heavier, \$3.50 to \$4, the price of the independent makers; galvanized wire, \$3.95 to \$4.45; galvanized barbed wire \$4.10 to \$4.85, galvanized fence staples, \$4.20 to \$4.85; painted barbed wire, \$3.40 to \$4.15; polished fence staples, \$3.50 to \$4.50; cement-coated nails, per count keg, \$2.85 to \$3.85; these prices being subject to the usual advances for the smaller trade, all f.o.b. Pittsburgh, freight added to point of delivery, terms 60 days, net, less 2 per cent off for cash in 10 days. Discounts on woven-wire fencing are 55 to 58 per cent off list for carload lots, 54 to 57 per cent for 1000-rod lots, and 53 to 56 per cent for small lots, f.o.b. Pittsburgh.

## Bolts, Nuts and Rivets

Large structural and ship rivets.....\$4.50  
Large boiler rivets.....4.60  
Small rivets.....50 per cent off list  
Small machine bolts, rolled threads.....60 per cent off list  
Same sizes in cut threads.....50 and 10 per cent off list  
Longer and larger sizes of machine bolts.....45 and 5 per cent off list

Carriage bolts, 1/2-in. x 6-in.:  
Smaller and shorter, rolled threads.....40, 10 and 5 per cent off list

Cut threads.....40 and 5 per cent off list  
Longer and larger sizes.....40 and 5 per cent off list  
Lag bolts.....50 per cent off list  
Pilot bolts Nos. 1, 2 and 3 head.....50 and 5 per cent off list  
Other style heads.....20 per cent extra

Machine bolts, c.p.c. and t. nuts 1/2-in. x 4-in.:  
Smaller and shorter.....40, 10 and 5 per cent off list  
Longer and larger sizes.....40 per cent off list  
Hot pressed sq. or hex. blank nuts.....\$2.25 off list  
Tapped nuts.....\$1.75 off list  
C. p. c. & t. sq. or hex. nuts, blank.....list plus \$1.00  
C. p. c. & t. sq. or hex. nuts, tapped.....list plus \$1.00  
Semi-finished hex. nuts, U. S. S. and S. A. E.:  
1/2-in. and larger.....50 and 10 to 40 per cent off list  
9/16-in. and smaller.....50 and 10 to 40 per cent off list

Stove bolts in packages.....70 per cent off list  
Stove bolts in bulk.....70 and 2 1/2 per cent off list  
Tire bolts.....50 per cent off list  
Track bolts.....5.50c. base

Square and hex. head cap screws:  
Rolled threads.....60 and 5 to 50 per cent off list  
Cut threads.....55 and 10 to 50 per cent off list

Set screws.....50 and 10 to 50 per cent off list  
One cent per lb. extra for less than 200 kegs. Rivets in 100-lb. kegs 25c. extra to buyers not under contract; small and miscellaneous lots less than two tons, 25c. extra; less than 100 lb. of a size, or broken kegs, 50c. extra.

All prices carry standard extras f.o.b. Pittsburgh.

## Wire Rods

No. 5 common basic or Bessemer rods to domestic consumers, \$57 to \$65; chain rods, \$57 to \$65; screw stock rods, \$62 to \$70; rivet and bolt rods and other rods of that character, \$57 to \$65; high carbon rods, \$75 to \$85, depending on carbons.

## Railroad Spikes and Track Bolts

Railroad spikes, 9/16-in. and larger, \$4 to \$4.25 per 100 lb. in lots of 200 kegs of 200 lb. each or more; spikes, 1/2-in., 3/4-in. and 7/16-in., \$4.40 to \$5; 5/16-in., \$5 to \$5.75; track bolts, \$7. Boat and barge spikes, \$4.40 to \$5 per 100 lb. in carload lots of 200 kegs or more, f.o.b. Pittsburgh. Tie plates, \$3 to \$3.75 per 100 lb.

## Terne Plates

Prices of terne plates are as follows: 3-lb. coating, 200 lb., \$13.80 per package; 8-lb. coating, I. C., \$14.10; 12-lb. coating, I. C., \$15.80; 15-lb. coating, I. C., \$16.80; 20-lb. coating, I. C., \$18.05; 25-lb. coating, I. C., \$19.30; 30-lb. coating, I. C., \$20.30; 35-lb. coating, I. C., \$21.30; 40-lb. coating, I. C., \$22.30 per package, all f.o.b. Pittsburgh, freight added to point of delivery.

## Iron and Steel Bars

Steel bars at 2.35c. from mill. Common bar iron, 3.63c. to 4.38c.

## Welded Pipe

The following discounts are to jobbers for carload lots on the Pittsburgh basing card:

Butt Weld			Iron		
Inches	Steel	Galv.	Inches	Black	Galv.
1/2, 3/4 and 1	47 to 50 1/2	30 1/2 to 24	1 1/2	15 1/2 to 25 1/2	+1 1/2 to 11 1/2
1 1/2	51 to 54 1/2	30 1/2 to 40	2	19 1/2 to 29 1/2	1 1/2 to 11 1/2
2 to 3	54 to 57 1/2	41 1/2 to 44	3 to 1 1/2	24 1/2 to 34 1/2	8 to 18 1/2
Lap Weld			Lap Weld		
2	47 to 50 1/2	34 1/2 to 38	2	20 1/2 to 28 1/2	6 1/2 to 14 1/2
2 1/2 to 6	50 to 53 1/2	37 1/2 to 41	2 1/2 to 6	22 1/2 to 30 1/2	9 1/2 to 17 1/2
7 to 12	47 to 50 1/2	33 1/2 to 37	7 to 12	19 1/2 to 27 1/2	6 1/2 to 14 1/2
13 and 14	37 1/2 to 41				
15	35 to 38 1/2				

Butt Weld, extra strong, plain ends			Lap Weld, extra strong, plain ends		
1/2, 3/4 and 1	43 to 46 1/2	25 1/2 to 29	1 1/2	21 1/2 to 29 1/2	8 1/2 to 16 1/2
1 1/2	48 to 51 1/2	35 1/2 to 39	2	23 1/2 to 31 1/2	11 1/2 to 19 1/2
2 to 3	52 to 55 1/2	39 1/2 to 43	2 1/2 to 6	22 1/2 to 30 1/2	10 1/2 to 18 1/2
	53 to 56 1/2	40 1/2 to 44	7 to 8	14 1/2 to 23 1/2	2 1/2 to 10 1/2
			9 to 12	9 1/2 to 17 1/2	8 1/2 to 15 1/2

To the large jobbing trade an additional 5 per cent is allowed over the above discounts, which are subject to the usual variations in weight of 5 per cent.

On butt and lap weld sizes of black iron pipe, discounts for less than carload lots to jobbers have been seven (7) points lower (higher price) than carload lots and on butt and lap weld galvanized iron pipes have been nine (9) points lower (higher price).

## Boiler Tubes

The following are the prices for carload lots f.o.b. Pittsburgh:

Lap Welded Steel	Charcoal Iron
1 1/2 to 1 7/8 in. + 7 to — 19 1/2	1 1/2 to 1 7/8 in. + 23
2 in. + 2 to — 19 1/2	1 7/8 to 2 in. + 20
2 1/4 to 2 1/2 in. + 3 to 30 1/2	2 in. + 10 to 15
2 1/2 to 3 in. + 11 to 30 1/2	2 1/4 in. + 10 to 12
3 1/2 to 4 in. + 20 to 40 1/2	2 1/2 in. + 1 to 10
	2 3/4 to 3 in. + 1 1/2 to 3
	3 1/2 to 4 1/2 in. + 8 to list

Standard Commercial Seamless—Cold Drawn or Hot Rolled

Per Net Ton	Per Net Ton
1 in. ....\$327	1 1/2 in. ....\$207
1 1/4 in. ....287	2 to 2 1/2 in. ....177
1 3/4 in. ....257	2 1/2 and 3 in. ....167
2 in. ....207	4 in. ....187
	4 1/2 to 5 in. ....207

These prices do not apply to special specifications for locomotive tubes nor to special specifications for tubes for the Navy Department which will be subject to special negotiations.

## Sheets

Prices of the Steel Corporation for mill shipments on sheets of United States standard gage in carloads and larger lots for indefinite delivery are given in the left-hand column. For prompt delivery, independent mills are quoting up to the prices quoted in the right-hand column:

## Blue Annealed

No.	Cents per lb.
8 and heavier .....	3.45 to 4.45
Nos. 9 and 10 (base) .....	3.55 to 4.50
Nos. 11 and 12 .....	3.60 to 4.55
Nos. 13 and 14 .....	3.65 to 4.60
Nos. 15 and 16 .....	3.75 to 4.70

## Box Annealed, One Pass Cold Rolled

Nos. 17 and 21 .....	4.15 to 5.30
Nos. 22 to 24 .....	4.20 to 5.35
Nos. 25 and 26 .....	4.25 to 5.40
No. 27 .....	4.30 to 5.45
No. 28 (base) .....	4.35 to 5.50
No. 29 .....	4.45 to 5.60
No. 30 .....	4.55 to 5.70

## Galvanized Black Sheet Gage

Nos. 10 and 11 .....	4.70 to 6.00
Nos. 12 and 14 .....	4.80 to 6.10
Nos. 15 and 16 .....	4.95 to 6.25
Nos. 17 to 21 .....	5.10 to 6.40
Nos. 22 to 24 .....	5.25 to 6.55
Nos. 25 and 26 .....	5.40 to 6.70
No. 27 .....	5.55 to 6.85
No. 28 (base) .....	5.70 to 7.00
No. 29 .....	5.95 to 7.25
No. 30 .....	6.20 to 7.50

## Tin-Mill Black Plate

Nos. 15 and 16 .....	4.15 to 5.30
Nos. 17 to 21 .....	4.20 to 5.35
Nos. 22 to 24 .....	4.25 to 5.40
Nos. 25 to 27 .....	4.30 to 5.45
No. 28 (base) .....	4.35 to 5.50
No. 29 .....	4.40 to 5.55
No. 30 .....	4.40 to 5.55
Nos. 30 1/2 and 31 .....	4.45 to 5.60



## Non-Ferrous Metals

### The Week's Prices

Cents Per Pound for Early Delivery

	Copper, New York		Tin	Lead		Zinc	
	Lake	Electro-lytic	New York	New York	St. Louis	New York	St. Louis
Nov.							
24	14.25	14.25	36.75	5.75	5.50	6.30	5.90
26	14.00	14.00	35.50	5.50	5.25	6.25	5.80
27	14.00	14.00	....	5.50	5.25	6.20	5.75
29	14.00	13.75	33.50	5.40	5.25	6.10	5.70
30	14.00	13.50	33.50	5.25	5.25	6.00	5.60

NEW YORK, Nov. 30.

Values of all metals continue to reach new low levels and buying is on a small scale. The copper market is still weak and sales have been made at new low levels. The tin market, both in London and here, has reached prices lower than in several years. The lead market continues to decline on liberal offerings. There is very little demand for zinc, which is still on the decline. Antimony is also lower.

### New York

**Copper.**—Further offerings of copper, either forced or otherwise, have sent the market to new low levels. The Steel Corporation, it is understood, to-day purchased 500 tons at 13.50c., which is the lowest price for a large quantity in a long time. Several of the large producers are not quoting, but it is understood that some of them would accept business at at least 14c., New York, and perhaps lower. There is reported to have been another sale last week of 500 tons at 14c. These purchases, fairly large under the circumstances, may indicate more interest on the part of consumers, and perhaps the bottom of the market. We quote electrolytic copper for early delivery and first quarter at 13.50c. to 14c., New York. Lake copper is nominal at 14c. It is interesting to note that of the total exports for the first nine months of this year Germany has taken 15 per cent, and ranks fourth among the foreign purchasers of copper.

**Copper Averages.**—The average price of Lake copper for the month of November, based on daily quotations in THE IRON AGE, was 14.67c. The average price of electrolytic copper was 14.63c.

**Tin.**—The feature of this market is that both grades of tin for all positions in London have fallen to the lowest levels in several years, and this has had its effect on the market here, where prices are also lower than in several years. To-day spot Straits in London is quoted at £207 10s., futures at £212 and spot Straits at £208 per ton. All these prices are around £20 to £23 lower than a week ago. The general market here is dull and slow. There are few sellers and also few buyers. Those willing to buy are looking for cheap tin, such as spot lots or metal ex-steamer at the dock. It is very evident that big dealers and importers have ceased selling at a price below the cost of import, and that this tendency is bound to be a stabilizing one in the near future. Only 50 tons of tin are reported to have been sold on the New York Metal Exchange the past week, 25 tons of spot Straits ex-steamer at dock at 35c. last Friday, and 25 tons of spot tin at 33.50c. yesterday. The slump in London is variously attributed by some to the Irish situation and others to the supposition that producers in the East are tired of carrying their stocks of tin and are putting out feelers. The quotation for spot Straits to-day was 33.50c., New York. Arrivals thus far this month have been 3170 tons, with 3180 tons reported afloat.

**Lead.**—Large offerings of lead continue to be made and as a result prices are declining. The fact that the London market has gone to new low levels is also a factor because of the possibility of further imports here. To-day spot lead is quoted at £25 and future at £26 per ton, the spot price being an equivalent of 3.90c., London, or about 5.40c., New York, duty paid. The

leading interest has not yet changed its quotation of 6c., New York and St. Louis, but is expected to do so any day, the outside market having reached 5.25c., both New York and St. Louis, offerings having been made at these levels, but no sales noted. The outside market is therefore quoted at 5.25c., New York and St. Louis, more or less nominal.

**Zinc.**—Prime Western has been offered and sold to-day at 5.60c., St. Louis, for early delivery. This is a new low level and is partly influenced by a further slump in London, where spot zinc to-day is quoted at £29 7s. 6d., with futures at £35 2s. 6d. per ton. Demand is naturally light, and so also are sales, most large producers parting with as little metal as possible at these unprofitable levels and many of them curtailing operations. One estimate of the present rate of production is 275,000 tons per year, with the prediction that this may go to a rate of 220,000 to 225,000 tons during the next month. The extent of the curtailment may be partially realized by the fact that the output of the country in 1912 was about 376,000 tons of prime Western. We quote the market for wholesale lots for early delivery at 5.60c., St. Louis, or 6c., New York.

**Antimony.**—Because of the general business situation and the process of readjustment wholesale lots for early delivery are now quoted at 5.75c., New York, duty paid.

**Aluminum.**—The leading producer has not changed its quotation for virgin metal, 98 to 99 per cent pure, which continues at 32.90c., f.o.b. producer's plant, but sellers in the outside market are offering the same grade at 25c. to 26c., New York.

**Old Metals.**—An unsettled feeling pervades the trade, as it is impossible to predict what the immediate future of the market will be. Prices generally have been lowered this week. Dealers' selling prices are nominally as follows:

	Cents Per Lb.
Copper, heavy and crucible.....	13.75
Copper, heavy and wire.....	12.50
Copper, light and bottoms.....	11.25
Brass, heavy.....	9.75
Brass, light.....	7.00
Heavy machine composition.....	13.50
No. 1 yellow rod brass turnings.....	7.50
No. 1 red brass or composition turnings.....	11.00
Lead, heavy.....	5.00
Lead, tea.....	4.25
Zinc.....	4.25

### St. Louis

Nov. 29.—The non-ferrous markets have been extremely dull and easy during the week, closing as follows: Lead, 5.75c.; spelter, 5.75c. to 5.90c. In less than car lots: Lead, 6.50c.; spelter, 6.50c.; tin, 39c.; copper, 15.50c.; antimony, 7.50c. In the Joplin ore district ore prices were softer and there was little or no buying in comparison with the usual situation. Lead, basis 80 per cent, was nominally \$55 per ton, but there was not enough demand to hold the price steady. Zinc blende and calamine were weaker and quotably about the same as the preceding week, but buying was light and the average for the week on all grades was lower than the preceding similar period. On miscellaneous scrap metals we quote dealers' buying prices as follows: Light brass, 5c.; heavy yellow brass, 7c.; heavy red brass, 10c.; heavy copper and copper wire, 10c.; light copper, 9c.; pewter, 24c.; tinfoil, 30c.; lead, 6c.; zinc, 4c.; tea lead, 3c.; aluminum, 15c.

### Chicago

Nov. 30.—The market is exceptionally weak and prices of both new and old metals have declined sharply. The situation is marked by frequent short selling and liquidation of speculative holdings at a loss. We quote Lake copper at 14.50c. in carload lots; tin, 36c.; lead, 5.50c.; spelter, 5.75c.; antimony, 7.50c. to 8c. On old metal we quote copper wires, crucible shapes, 9c.; copper clips, 9c.; copper bottoms, 7.50c.; red brass, 9c.; yellow brass, 6c.; lead pipe, 3.75c.; zinc, 3c.; pewter, No. 1, 18c.; tinfoil, 20c.; block tin, 25c.; all these being buying prices for less than carload lots.

# Working Galvanized Scrap in the Basic Open-Hearth

German Method of Recovering the Zinc in Making Steel—Character of the By-Product and Its Uses

—BY R. W. MUELLER—

THIS paper describes an installation and method of working galvanized scrap in the basic open-hearth furnace, with the simultaneous recovery of the zinc as zinc oxide. No open-hearth man likes to work scrap with a metal or enamel coating, because the coatings affect the quality of the steel and even injure the lining of the furnace. Among the scrap causing brittle steel is metal coated with tin, copper, copper-nickel, or brass, which kinds of scrap will not be discussed here. In another group may be placed metal coated with lead, zinc or enamel. The lead and enamel injure the basic hearth, and the enamel may make the steel brittle and have a bad influence on the slag. The zinc produces zinc-oxide which tends to fill up the checkers and forms an impervious coating of zinc silicate on the surface of the checker bricks.

No successful method has so far been devised to deal with lead-coated sheet. Galvanized metal has been handled by dissolving the zinc with acid and baling the de-zincd scrap. The zinc solution thus obtained usually contained much iron, which caused trouble. Some work was done to determine the amount of zinc on various grades of coated material, the results being:

	Zinc Per Cent
Old pails, hot galvanized.....	12.00 to 17.50
New hot galvanized sheet.....	10.00 to 17.50
Old galvanized sheet.....	8.50 to 17.50
Very thin sheet.....	3.50 to 17.50
Hot galvanized wire.....	3.50 to 17.50
Electro-galvanized wire .....	1.00
Electro-galvanized sheet .....	2.30

An advantage of the proposed process is that cheap galvanized scrap can be used, and the zinc oxide obtained has a direct money value. So far it has been carried out in a small open-hearth furnace of 12 to 15 tons capacity. The charge being 2 tons pig iron, 3 tons scrap cast iron and 8 tons galvanized scrap. To this was added 220 to 330 lb. petroleum coke, according to the method of melting to save pig iron. Final additions were 175 to 220 lb. ferromanganese and a little 45 per cent ferrosilicon. Such a charge was used for about three years and good steel obtained. In general the finished steel contained about 0.10 per cent carbon used for sheet. A few typical heat analyses were:

Carbon, Per Cent	Manganese, Per Cent	Phosphorus, Per Cent	Sulphur, Per Cent
0.084	0.43	0.023	0.040
0.083	0.68	0.031	0.053
0.078	0.51	0.018	0.044
0.085	0.43	0.042	0.057
0.082	0.60	0.035	0.065
0.082	0.43	0.037	0.061
0.079	0.43	0.022	0.048
0.079	0.51	0.036	0.073
0.079	0.55	0.043	0.056
0.110	0.43	0.029	0.032
0.080	0.51	0.030	0.057

An average slag analysis was  $\text{SiO}_2$ , 16.80;  $\text{FeO}$ , 26.73;  $\text{MnO}$ , 12.84;  $\text{P}_2\text{O}_5$ , 2.13;  $\text{CaO}$ , 36.32;  $\text{MgO}$ , 4.30, and  $\text{SO}_3$ , 0.08 per cent. The melting loss was high, 12 to 15 per cent, but it must be remembered the zinc is included in this, which ran usually about 8 per cent of the galvanized scrap. On ordinary charges this same furnace showed about 8 per cent melting loss.

The furnace and process are covered by two German patents, DRP 267582 and DRP 280414. The furnace is similar to any other open-hearth, except that at each end the air port has an extension leading to a chamber lined with firebrick. By specially constructed valves, the furnace can be closed at each end so that the gas containing zinc oxide is led to the chamber and cooling arrangement. From here the gas passes through exhausters to special filtration apparatus. The exhauster has a capacity of 35,000 to 42,400 cu. ft. per min. The

first operation is to melt the pig iron and cast iron scrap. Then one end of the furnace is closed, so that the waste gases are pulled to the cooling arrangement of the exhauster. Gas and air are coming to the furnace as usual. The galvanized scrap is then charged, the air valve opened a little more than usual, and the zinc oxide produced passes to the cooling arrangement, exhauster and filtration chamber. After a certain time the furnace is reversed. The process of burning the zinc to zinc oxide and removing from the furnace takes about two hours, the end being detected by the absence of zinc oxide fumes in the gas. The chimney valves are then opened, the special valves closed, and the furnace is again an ordinary open-hearth. As a rule the time of each heat is 5 to 5½ hr. from the beginning of melting. A necessary condition is that the furnace and checkers be at as high a heat as possible before the galvanized scrap is charged.

The cooling arrangement used is a system of pipes 4 ft. 7 in. diameter, 19 ft. 7 in. high. Forty pipes are used, arranged in four series, so that in each series are five uptakes and five downtakes. The upper end of the pipes are joined by bent pipes, but the lower ends fit into four steel chambers with a hopper arrangement below providing a ready means of removing the zinc oxide that collects. The total cooling surface is about 18,300 sq. ft. and is sufficient to cool the gas from 1500 to 150 deg. C.

The cooled gas then passes to a large steel box with hoppers beneath, where it is still further cooled and its pressure reduced, after which it goes to a bag-house for filtration. There are 450 bags with a total surface of about 54,000 sq. ft. A typical analysis of the fine zinc oxide shows:

	Per Cent		Per Cent
ZnO .....	96.61	MnO .....	0.04
PbO .....	2.07	$\text{SO}_3$ .....	0.19
$\text{Fe}_2\text{O}_3$ .....	1.28		

The uses of the zinc oxide are as follows: First, that obtained in the first pipes and chambers is sold to the zinc smelters. It is coarse and cannot be used for paint. Also it contains slag and impurities and usually runs 40 to 60 per cent zinc. It finds a ready market as a zinc core. Second, the product of the air cooling arrangement and pressure reducing chamber is much finer grained. It is put through a sifting machine, the coarse part sold as before and the fines sold to paint manufacturers. Finally, the product of the bag house is very fine and is sold directly to paint makers. G. B. W.

## Refined Tungsten Below Pre-War Level

The tungsten industries at Washington, D. C., have established a new low price record on granulated ferro-tungsten at 59c. per lb. of contained tungsten, free from tin, copper and oxygen, under 0.50 per cent carbon, and extremely low in sulphur and phosphorus. This action was taken in order to meet foreign competition and the industries feel that American high-speed steel may now be manufactured cheaper than in Great Britain. This is now the quotation of the Chemical Products Co., Washington, D. C.

## Price Reductions at Youngstown

YOUNGSTOWN, OHIO, Nov. 30.—The leading independent announces a reduction in sheet prices to 4.05c. for blue annealed, 4.85c. for black and 6.20c. for galvanized, all base. These prices are \$10 above Steel Corporation quotations. Another interest, however, is quoting black at 5.50c. and galvanized at 7c.

The Trumbull Steel Co. has reduced tin plate to \$7 per base box on forward business, the American Sheet & Tin Plate quotation.

## PERSONAL

### Officers of the Crucible Steel Company

Directors of the Crucible Steel Co. of America have organized by the election of the following officers: Horace S. Wilkinson, chairman; Dr. John A. Mathews,



DR. JOHN A. MATHEWS

president; George E. Shaw, vice-president and treasurer; Gilbert M. Black, vice-president in charge of operations; F. B. Hufnagel, vice-president; J. M. McComb, vice-president in charge of credits; R. H. Illingworth, vice-president; W. R. Joralemon, secretary and assistant treasurer; A. A. H. Niebaum, assistant treasurer; H. F. Kress, assistant secretary and treasurer; H. L. Gellinger, auditor, and D. C. Barry, comptroller.

Dr. John A. Mathews, who moves up from the position of first vice-president of the company to the presidency, has been identified with the company since 1902. His first connection was with the Sanderson Brothers Steel Co., a subsidiary, at Syracuse, N. Y., as metallurgist. Later he was made president of the Halcomb Steel Co., another subsidiary at Syracuse, going to Pittsburgh about a year ago, when he was elected first vice-president of the parent company. He was born in Washington, Pa. He was graduated from Washington and Jefferson College and secured a Ph.D. degree from Columbia University in 1908. He was a research student in the Royal School of Mines, London. He was a Carnegie research scholar in the Iron and Steel Institute of Great Britain and was the first Carnegie gold medalist of the institute. He taught at Columbia University for nine years.

F. B. Hufnagel, president Pittsburgh Crucible Steel Co., a subsidiary of the Crucible Steel Co. of America, who has been elected vice-president and a director of the latter, is a graduate of Cornell University. For the past 20 years he had been connected with the Jones & Laughlin Steel Co., Pittsburgh, and before that for a brief period, following his graduation from Cornell, had been with the Newburgh works of the American Steel & Wire Co. in Cleveland. Starting as a member of the engineering staff of the South Side Works of the Jones & Laughlin Steel Co., he advanced through the rolling mill department until he became general superintendent of that works. In 1912 he was transferred to the Aliquippa works of that company in Woodlawn, Pa., in the capacity of general superintendent and remained in that position until about a month ago, when he resigned to become president of the Pittsburgh Crucible Steel Co. A gold watch and chain and a solid silver tea set were presented him by the department heads and workmen of the Woodlawn plant, and he was the guest of the business men of that community at a dinner last week in recognition of the work he had done in building up that town.

A. Rosmarin, 233 Broadway, New York, who has been connected with A. F. Thane & Co., iron and steel, New York, as New York manager and assistant secretary since February, 1919, has severed his connection.

F. W. Hawes, formerly chief engineer and manager of the Distel Wheel division of the Detroit Pressed Steel Co., has resigned to become associated with H. S. Graves, who has opened a sales office of the Automotive Trailer Co., Springfield, Ill., at 6553 Woodward Avenue, Detroit.

W. J. Kaup, consulting metallurgical engineer, New York, gave an address on "Steel and the Man; Their Character as Developed by Treatment," before the

Springfield Chapter, American Society for Steel Treating, on Nov. 29.

L. F. Adams, electrical engineer power and mining department, General Electric Co., Schenectady, N. Y., is scheduled to address the Cleveland section of the Association of Iron and Steel Electrical Engineers on Dec. 13 on "Continuous Rated or 50-Deg. Rise Motors." The meeting will be held at Electric League Club Rooms, Hotel Statler.

J. H. Burgess, who has been Michigan representative of the Standard Welding division of the Standard Parts Co., Cleveland, has resigned, effective Dec. 1.

John N. Mowrey, Philadelphia, has been made general manager of the Worcester Pressed Steel Co., Worcester, Mass., and will assume his new duties Jan. 1. Mr. Mowrey succeeds Donald C. Nicholson, resigned.

Edward Aubitz has resigned as shop superintendent of Spang & Co., Butler, Pa., to become plant superintendent of the Commercial Drop Forge Co., Warren, Pa., plant, which is well under way and which expects to start operations soon after Jan. 1.

James R. Ryan, general manager and treasurer International Purchasing & Engineering Co., Detroit, has sailed for Europe, where he will call on the automobile manufacturers which his company represents in Detroit as purchasing agent. Mr. Ryan has taken with him blue prints and other data from virtually every automobile parts manufacturer in this country.

Harry S. Mulliken, who has been appointed metallurgical engineer, Bureau of Mines, Washington, is a graduate of the Worcester Polytechnic Institute, and well known throughout New England. He has been variously connected with mining and metallurgical enterprises, as superintendent, lead smelter, Pilot Bay, British Columbia; superintendent, American Smelting & Refining Co., Auguas Calientes, and Monterey, Mexico; general superintendent and plant manager, Penoles Companies, Mapirni, Mexico; in charge of metallurgical operations of the American Metallurgical Co.'s interests in Mexico; and consulting engineer in metallurgy for the same company, with offices in New York.

W. J. White, formerly Cleveland district manager Reading Iron Co., has been made manager of the pipe department of the Mill & Mine Supply Co., Akron, Ohio. T. E. C. Hunter, for 14 years with the American Radiator Co., has been made manager of the plumbing and heating department. H. L. Senn, formerly with the Worthington Pump & Machinery Corporation, is the new manager of the machinery department. The company, organized in 1917, recently moved to 211 Broadway Street, Akron, and increased its capital from \$100,000 to \$500,000.

Charles O. Rowe, formerly of the sales department of the Hess Steel Corporation, Baltimore, Md., has been appointed district manager of sales for the Philadelphia district for the Electric Alloy Steel Co., Youngstown, Ohio. The appointment became effective Nov. 10. The company, dating from Nov. 29, will have an office at Room 511, Pennsylvania Building, Philadelphia, in charge of Mr. Rowe, the territory covered including eastern Pennsylvania, New Jersey, Maryland, Virginia, West Virginia and the South. The company has a plant in operation at Charleroi, Pa.

The Gerlinger Electric Steel Casting Co., West Allis, Wis., has placed M. W. Wetzler in charge of its credit department.

A. H. Berchen has resigned his position with A. S. Cameron Steam Pump Works, New York, to accept a position with the Charles F. Ames Co., Ltd., 90 West Street, New York, sales managers in the vicinity of the Blake Pump & Condenser Co., Buckeye Iron & Brass Works, Harrisburg Foundry & Machine Works, John H. McGowan Co., Midwest Engine Co. and Rogers-Higgins Co.

Francis W. Wilson, engineer of bridges, New York Central Railroad, and a member of the New England Iron League, sailed recently for New Orleans, whence he will sail for Europe to be gone several years. Mr. Wilson makes his home in Boston.



Richard W. Tull, who has been contracting manager of the Eastern Steel Co., in the New York office, has resigned, and on Jan. 1, will become the sales agent in New York of the Montgomery Iron and Steel Co., Philadelphia. The office of this company in New York has been removed from the Condler Building to the Park Row Building. Mr. Tull is at present with his wife on a pleasure trip to the Pacific Coast.

John W. Billings, formerly of the sales department of the Gulf States Steel Co., Birmingham, Ala., has resigned and has accepted a position with the Jones & Laughlin Co. as traveling representative in the southeastern States. Mr. Billings' headquarters will be in Cincinnati.

John C. Pangborn, vice-president Pangborn Corporation, Hagerstown, Md., manufacturer of sand blast and allied equipment, sailed Nov. 27 from New York on the Olympic for Southampton. He will spend several months in Europe on business.

An item concerning Harry A. Schwartz, which was published in the Nov. 11 issue of THE IRON AGE, is incorrect. There are two men of this name. Mr. Schwartz of the Defiance Machine Works, Defiance, Ohio, has made no change in his position. The other Mr. Schwartz, who was formerly with the Indianapolis office of the National Malleable Castings Co., is now manager of research, research laboratory, in the Cleveland branch of the National Malleable Castings Co.

Joseph G. Butler, Jr., vice-president Brier Hill Steel Co., Youngstown, Ohio, submitted to a minor operation Nov. 26 in an endeavor to correct a chronic affection from which he has been suffering for about a year as a result of an automobile accident. Despite his advanced years, Mr. Butler rallied nicely.

O. E. Falls, formerly in charge of foundry and thermit welding work at the Norfolk Navy Yard, Portsmouth, Va., has accepted a position with the Metal & Thermit Corporation, New York.

W. D. Langford, for several years purchasing agent for Westinghouse, Church, Kerr & Co., and later for the Dwight P. Robinson Co., Inc., 61 Broadway, New York, following its absorption of the Westinghouse company, has resigned.

## Organizing Sections of Industrial Cost Association

Sections of the Industrial Cost Association are to be organized in Boston, New York, Chicago, Portland, Hartford, Philadelphia, San Francisco, Pittsburgh, Cleveland, Detroit and Birmingham, and temporary chairmen have been appointed for the purpose.

The objects of the association, which have already been referred to in these columns, are as follows: To stimulate the interest of manufacturers in correctly determined costs; to standardize cost and accounting terminology; to simplify cost accounting; to educate members in the use and advantages of graphic charts and other modern methods of cost analysis and control; to assist members who are identified with cost committees of trade associations in formulating uniform cost methods and to recommend the adoption of such uniform methods; to provide a forum for the discussion of cost problems and practices through general and local meetings; to establish a library of cost literature, and to maintain a bureau of information through which members may be assisted in the solutions of their individual cost problems, etc.

Active membership in the association is limited to officers and managers of industrial corporations, firms and trade associations and to employees having executive supervision of their cost accounting. Associate membership is extended to bankers, engineers and others whom the directors may wish to have affiliated with the association in an advisory capacity. Membership dues are \$25 per annum. A. A. Alles, Jr., Fawcett Machine Co., is secretary-treasurer with offices in the Peoples Bank Building, Pittsburgh.

## OBITUARY

LUCIUS J. KNOWLES, president Compton & Knowles Looms Works, Worcester, Mass., died Nov. 26, at the Ritz Hotel, in London, following a brief illness from influenza, which developed into meningitis. He was 41 years old. With him at the time of his death was Major Rufus S. Frost, sales department, Compton & Knowles Looms Works. Mr. Knowles was born in Worcester, April 6, 1879. His education was obtained in the Worcester schools, Dalzell Preparatory School, Worcester Academy and Harvard University. On Dec. 1, 1903, he became associated with the Compton & Knowles Loom Works, and from 1906 to 1917 served as treasurer of that company. In February, 1917, Mr. Knowles succeeded Charles Henry Hutchins as president, and under his guidance the corporation grew in importance. He was a member and officer of a large number of industrial, banking and social organizations.

GEORGE FAWCETT SCOFIELD, vice-president and director Lake Erie Iron Co., Cleveland, died suddenly Nov. 24 of heart disease while a guest at the home of William P. Palmer, president American Steel & Wire Co. Mr. Scofield, who was 59 years of age, was long connected with the iron industry in Cleveland and was the son of the late William J. Scofield, who for many years was at the head of the Lake Erie Iron Co. One brother, Frank R. Scofield, is president of that company, and another brother, Charles W. Scofield, is its secretary and treasurer. In 1919 this company leased its plant, which consists of a rolling mill and bolt and nut factory, to the Lake Erie Bolt & Nut Co., which is now operating it. After the present company took possession of the plant Mr. Scofield retired from active business.

DANIEL LONGFELLOW PLUMER, Wausau, Wis., one of the founders of the Northern Chief Iron Co., Ashland, Wis., died Nov. 20 at the age of 83 years. He was born in England, where he was educated as a civil engineer. While making surveys in northern Wisconsin for the old Wisconsin Central Railroad, Mr. Plumer located iron ore in Ashland county, as the result of which the Northern Chief company was organized in 1881. He retired as president in 1918. Mr. Plumer was president of the First National Bank of Wausau until his death.

EDWARD HERMS died Nov. 4 at his home in North Tonawanda, N. Y., after a prolonged illness of heart trouble. He was superintendent of the Strong Steel Foundry Co., Buffalo, for several years; also superintendent of the open-hearth department at the Pittsburgh Steel Foundry Co. At the time of his death he was employed as chemist at the Buffalo Bolt Co., North Tonawanda.

CARL K. BADGER, assistant production manager General Electric Co., Pittsfield, Mass., died Nov. 25 at the Massachusetts General Hospital, Boston, from an abscess on the lungs, aged 38 years. He had been with the General Electric Co. 22 years.

B. F. TOBIN, chairman of the board of the Continental Motors Corporation, Detroit, and Muskegon, Mich., died in Detroit, Nov. 23, aged 55 years. Mr. Tobin was the founder of the Continental company.

## Foreign Trade Convention of 1921

Announcement is made by O. K. Davis, secretary of the National Foreign Trade Council, that the Eighth National Foreign Trade Convention will be held in Cleveland, May 4, 5, 6 and 7, 1921. In notifying the delegates to previous conventions of the place and dates for the 1921 meeting, Secretary Davis says: "The domestic business depression through which we are now passing has reaffirmed most convincingly the arguments in favor of foreign trade. Everywhere I find that those producers who are enjoying the greatest demands for their products and who are enabled most readily to maintain their production, are the firms who had built up a substantial foreign business in various markets along systematic and permanent lines."

## STEELS CONTAINING URANIUM

### Some French Experiments With Plain Alloy Steel—Physical and Other Properties

A long article on uranium steels by E. Polushkin appears in *Revue de Metallurgie* for June, 1920. The steels were made in a small electric arc furnace of about 400 lb. capacity.

A brief description of one heat says the charge was composed of turnings and scrap and was melted down with lime. The first slag was removed and the steel refined under a second basic slag. The time of the heat was 4 hr. 5 min. Additions in the furnace were ferromanganese and ferrosilicon and in the ladle carbundum and ferrouanium. The latter alloy was sometimes added in the furnace, sometimes in the ladle. When in the ladle from 70 to 75 per cent recovery of uranium was sometimes obtained, but generally the percentage obtained in the steel was irregular, often less than 50 per cent. Physical and other tests show no difference in results whether the alloy was added in the furnace or the ladle. As a rule two ingots were obtained,  $4\frac{1}{2} \times 4\frac{1}{2}$  in., weighing about 120 lb. each.

The results showed the steel to be full of defects such as blowholes and pipes. It is certain that these defects have their origin more in the method of steelmaking than that they are caused by the uranium. (It is also certain that the physical results at least must be influenced by the poor steelmaking practice, and this admission by the writer that the ingots contained many defects must be borne in mind in reading his paper.) The ingots were forged into octagonal bars and then annealed.

#### Critical Points and Static Values

Critical points on heating and cooling were determined with a Leeds & Northrup instrument on 20 steels, with carbon varying from 0.20 to 1 per cent, and uranium varying from 0.20 to 7 per cent. The majority of the determinations give the beginning and maximum of  $A_c$  between 740 and 750 deg. C.  $A_r$  is only visibly lowered when the uranium exceeds 2 per cent. With less than this amount there is no regular influence. With increasing amounts above 2 per cent  $A_r$  is lowered and gradually suppressed, and a steel with 7.1 per cent uranium and 0.47 per cent carbon showed no critical points on cooling.

The tensile tests were all made on an Olsen machine, and in all but a few cases the elastic limit was determined by the drop of the beam. The heat treatment was applied to test pieces 0.505 in. diameter and 2 in. between center punch marks, except that the diameter was 0.030 to 0.040 in. above 0.505 in. This small amount was removed by turning before testing. With steels containing uranium alone and with carbon 0.25 to 0.45 per cent, the elastic limit and ultimate stress were raised without the ductility being affected. In some cases the ductility was even slightly raised. In steels with 0.60 per cent or more carbon the elastic limit and ultimate stress were raised by uranium, but these steels show considerably reduced ductility.

The superior qualities of all these steels is only obtained after quenching and slight tempering. In no case were remarkable results obtained that could not have been obtained with other special steels. The introduction of uranium in steels in amounts greater than 0.50 to 0.60 per cent is not necessary, for no new result is obtained.

#### Effect of Uranium on Structure

The carefully polished surfaces of steels with uranium always show hard grains of carbide of uranium, and the best method of showing this carbide is by heat-tinting. The chemical formula of this carbide has not yet been determined exactly, but the study of iron-uranium alloys leads one to suppose that it is UC. A part of the uranium is always in the condition of oxide, and it is impossible to prevent its formation because of the rapid oxidation of uranium. It was found in all the steels. The conclusion was that uranium has no important influence on the structure of the steel.

In regard to steels with nickel and uranium only

one was found where the uranium had an influence, and in this heat the ductility was raised. Also in comparing the steel with uranium and chrome with an ordinary chrome steel no new result was seen. Careful shock tests were made on all the steels, and uranium was not found to have any effect on the results. This was also true in regard to tests subject to alternating stress. Also experiments showed that the carbide of uranium did not go into solution in the ferrite.

To sum up: In steels with medium carbon, that is 0.25 to 0.45 per cent, the uranium was found to raise the elastic limit and ultimate stress without affecting the ductility, or even raising it. also. Brinell tests show that uranium increases the hardness of steel. One heat with uranium and nickel gave very good results, showing ductility superior to ordinary nickel steel or chrome vanadium steel, but the other heats did not show any favorable effects of the uranium. The good effect of uranium mentioned above was not determined exactly, but in all cases no remarkable result was obtained that could not be obtained from other special steels.

G. B. W.

### Bond Resistance Between Concrete and Steel

WASHINGTON, Nov. 15.—The Bureau of Standards has sent to the printer *Technologic Paper*, No. 173, dealing with the results of a long series of tests on the bond resistance between concrete and steel. The tests were made in three series:

Tests to determine the effect of preservative coatings on bond resistance of reinforcing bars embedded in concrete.

Tests to determine the length of the lap which is necessary in order to secure the effective splicing of bars by lapping in regions of high tension.

Tests to determine as to the effectiveness of the anchorage of stirrups in the flanges of T-beams when the loads on the beams are placed in such a way as to put tension across the plane of connection between the flange and the stem of the beam.

The tests with preservative coatings gave the following results:

The minimum stress developed by bars which were painted, was generally considerably less than the bond resistance of unpainted bars, but the reduction in maximum bond resistance due to galvanizing and some similar processes was less than that due to painting.

Coated deformed bars apparently slipped considerably before the corrugations or lugs reached a firm bearing. After a bearing had been secured the increase of resistance with increased slip was similar to that which took place with uncoated deformed bars.

The bond resistance at a slip of 0.001 in. was a much smaller proportion of the maximum bond resistance for coated bars than for uncoated bars.

The tests of beams with lapped bars indicated that:

Proceeding along a lapped bar toward its unanchored end from the point where the stress in the bar began to diminish the stress lost from this bar was picked up by the other bars of the beam. In a majority of cases a slightly larger amount of the stress lost by the lapped bar was picked up by bars immediately adjacent than by other bars of the beam.

A lap of about 48 dia. of the bar was necessary to secure a satisfactory splice. The bars used were  $\frac{1}{2}$  in. in diameter and the concrete had a strength of about 5000 lb. per sq. in. Alongside the lapped bars were unspliced bars which extended throughout the total length of the beam.

"The pull-outs tests of stirrups," says the official abstract of the report, "indicated that right-angle hooks formed by bending through 90 deg. were not as effective for anchorage as right-angle hooks bent through 270 deg. The anchorage was less effective when the loop formed by the 270-deg. turn was kept empty than when it was filled properly with concrete."

"Argos Steel Digest" is the title of a new house organ being published by the Argos Steel Products Corporation, 170 Broadway, New York, iron and steel exporter. It is an eight-page paper intended for circulation to the company's customers and contains market reviews of various materials with large extracts from the reports of THE IRON AGE. The Argos Steel Products Corporation will shortly issue a series of bound booklets covering various phases of the steel industry.



## Rail Shortage Estimated at 12,000,000 Tons

(Continued from page 1475)

plated. A conservative estimate of the country's ability to furnish rails without serious interference with other business gives 3,500,000 tons as the possible annual yield, and this is a million tons short of what ought to be supplied annually for the next five years. Let us hope, however, that conditions will brighten so that, as was formerly the case, the steel rail business will be considered more attractive to the mills and production be resumed on a scale necessary to meet every demand that the roads may make for tonnage and prompt delivery. Orders for 1921 rails are running fully 20 per cent larger than the orders placed by the same roads for 1920 rails, a condition which obviously indicates that railroad officials are thoroughly awake to the necessity for rehabilitating the tracks as rapidly as time and finance will permit.

### Question of Rail Specifications

There is little question that the general adoption of open-hearth steel has gone a long way toward satisfactorily solving problems of wear that were so frequently raised with Bessemer rails. The question of safe rails is now much more important than whether rails will give a year or two more service. Interpreting published records in a certain way indicates that for open-hearth steel one rail out of every 800 laid may be expected to fail and have to be replaced in the first five years of service. Although such figures may seem appalling, solace is found in the fact that only about half of the total failures are what may be termed of a dangerous type. The others mostly consist of defects occurring in the head of rails, which as a rule can be easily detected by careful surveillance and removal prior to the development of further trouble.

Most rail specifications are too broad in certain features and too narrow in certain others. Manufacturers frequently find it difficult to get good steel quickly accepted, and on the contrary, railroads are frequently bound to accept what unquestionably ought to be rejected outright.

To illustrate the point, consider for a moment 90-lb. rails for which there are at least four specifications in common use having the low limits of carbon varying by the small difference of four points. If a mill rolling for one customer whose low limit of carbon is 0.63 per cent happens to get a heat showing 0.62 per cent carbon but satisfactory in all other respects, the slight difference of one point of carbon in the specification makes it necessary for the rails, or perhaps the ingots, to be diverted from the original to some other customer. That possibly means allowing the ingots to get cold, later to be reheated and rolled—a performance almost bound to result in inferior practice both in the mill and later on the track. The matter of a few points of carbon, and possibly some other elements, has repeatedly been proved to be quite insignificant in the long run and easily overshadowed by the kind of treatment accorded the steel in the mill. Determination of what constitutes a reasonable minimum limit for carbon and insistence on such as a standard, the same as 0.04 per cent has been fixed for years as a maximum for phosphorus, would be a great step forward in harmonizing specifications without serious detriment to the users.

### Demanding Rigorous Straightness

Again, specifications lack breadth in the customary clause governing straightening. No doubt the specifications used in 1844 read the same as they do now; namely, that "rails must be straight in line and surface." The result of this requirement is that rails may be strained beyond their elastic limit in twenty or more places by repeated blows in the cold straightening press, only then to be shipped to a five or six degree curve and readily spiked into place. Modern section rails are exceedingly flexible and, providing they contain no short bends or sharp kinks, it would seem practicable to accept them within certain limits perhaps, without the damaging cold straightening now given to each and

every rail. Experimental lots of such rails have given fair service and the subject deserves more attention.

### Needed Investigation of Chemical Tests

Most rail specifications are too broad with respect to the testing, both chemically and physically. The chemical composition is invariably obtained by analyzing drillings taken from a small test ingot weighing a couple of pounds and cast while the regular ingots are being poured. There is no prescribed size or shape for the test ingots used by the different mills, nor restriction on whether they shall be cast from the first, middle, or last part of a heat. In fact, no restrictions prevail of any moment whatsoever, pertaining either to the test ingots *per se* or to the chemical practice that may be later followed in doing the analytical work. The result is that the actual chemical composition reported by the mills for their steel may vary decidedly as between different mills, so that a 65 carbon heat in Colorado may be quite different from a 65 carbon heat in Alabama or Pennsylvania. It should be said in justice that this subject is being investigated and early action is hoped for.

### Objectionable Physical Tests

The physical tests do not, as a rule, go far enough to protect against bad or unsound rails being accepted and laid in the tracks, only to be replaced perhaps after a short service. Testing two or three pieces of rails to represent as many as two hundred made from perhaps fifty ingots, each possessing marked individuality, even though from the same heat, is incompatible with the tests prescribed for many other products on whose use hinges no important question of life. A requirement for oil line pipe is that each and every length, in addition to passing a careful surface inspection on both the inside and the outside, shall withstand a prescribed pressure test. Each piece of cast iron water pipe, whose walls may be an inch thick, must likewise be tested and inspected. And a most odious comparison with the tests on rails is afforded by a recently adopted specification for wrought iron tie plates, which requires a complete tensile test to be made on one out of every thousand plates, a proportion by weight which if applied to rails would mean something like sixteen tensile tests per heat.

The proposed abandonment of the drop test, for years recognized as a standard test for brittleness, and the plan of covering this feature by resort to a measurement for ductility obtained under difficult and uncertain conditions, is regrettable. Granting the importance of ductility for rail steel, the imposition of arbitrarily determined limits for it, the matter of measuring it satisfactorily except in the laboratory, and finally the question of accepting or rejecting rails whose ductility varies by a hundredth part of an inch, is, to my way of thinking, positively dangerous. Would it not be better to waive the question of the ductility of rails entirely, as it was so long an unknown thing, and to devote more study to the definition of "interior defects" and such positive methods for detecting them as would permit of rejecting these rails whose test piece fractures show unmistakable signs of segregation?

The manufacture of basic open hearth steel rails of modern sections is a process fraught with many questions of practice very different from that followed in the Bessemer methods of a few years back. The introduction of large furnaces from which a hundred tons of steel is tapped for a single heat, the casting of as many as fifty ingots on a heat, the use of large heavy ingots, and last but not least the fact that modern rail steel is sufficiently high in carbon to be easily susceptible to heat treatment, are features so influencing the general process as to make constant attention necessary to matters that in the old days were scarcely present at all.

My observations of manufacturing conditions, resulting from the closest of contact with the special inspection of rails at all of the different mills, convinces me that many of these often neglected matters are paramount to other details so frequently brought to the front; as, for instance, a few points of carbon. And in this connection permit me to say that special inspection has not only revealed many important incidents that no mill superintendent will condone when his attention



is called to them but it has also afforded opportunity of tracing the history of bad rails in service back to some slighted detail of manufacture no doubt responsible for the failures.

#### What Needs Attention in Rail Making

I regard the manufacture and rolling of rail steel as of more importance than that of any other steel product, and conditions emphasize the necessity of making thorough studies of the various features of present day methods. Such studies must frequently be based not only on the manufacture itself but on the story that the rails in service may later tell. Records for many subjects are already in hand and time and work are merely required to afford definite information on questions of great value to both railroads and manufacturers. Literature is very weak on many of the subjects that ought to be investigated and discussed, and among the many questions that can be raised I suggest some of the following pertinent of modern practice and especially appropriate, therefore, for original research and study.

1. Are rails made of steel by the continuous Talbot furnace process comparable with those made by the straight open-hearth method? In the continuous process the furnace is seldom emptied but a hundred tons or so of steel is tapped every two hours, as against the ten hours of time required to make an equivalent heat in a regular furnace. Is the steel from the rapid working Talbot furnace sufficiently free from oxides and other impurities to afford good, sound rails, and how can such a matter be quickly proved?

2. What effect, if any, on rails has steel made by the duplex process, wherein highly oxidized metal is added to the open-hearth furnace, sometimes very soon before tapping? How can rails rolled from steel containing excessive amounts of impurities be detected?

3. What effect on rails is produced by recarborizing the

steel in the ladle with coal or coke and then adding cold deoxidizers to the ladle? What is the real effect produced by holding a ladle of steel prior to casting the ingots to permit of time for the chemical reactions to settle?

4. What is the effect on rails rolled from ingots cast with running stoppers and sometimes without any control by the ladle operator? How does the size of the nozzle, pouring temperatures, and time required to cast the ingots of a heat influence rails?

5. How soon after casting ingots should they be charged into the soaking pits in order to assure a minimum of piping and segregation? What effects are produced by delays in promptly charging the ingots to the pits, and what is the effect of unduly and rapidly chilling the outside or skin of the ingots?

6. How long a time and under what conditions of gas and air regulation should ingots remain in the soaking pits? What kind of control of the pits is best to insure against overheating or burning the ingots? What is the effect of rolling rails from ingots one side of which has been heated so hot as to show a bright white spot significant of overheating?

7. What effect on rails has different rates of blooming the ingots? In some cases 8 x 8-in. blooms are made from ingots in nine passes and in other cases in 20 passes. Some mills work rapidly and others slowly; does this produce any difference?

8. What effect on the grain structure or the life of rails is produced by increasing the number of passes, or work given to the steel, when the ingots are rolled into rails? One mill makes a rail from a 19-in. square ingot in 15 passes, while another mill makes the same rail from 24-in. square ingot in 29 passes. Has the average rate of reduction per pass any effect on the life of rails?

9. What matters mostly influence the production of rails showing seams on the surface? Some heats are practically free from indications of seams, while on other heats rolled at the same time seams are abundant.

## TRADE CHANGES

The Metal & Thermit Corporation, New York, has opened a branch office at 141 Milk Street, Boston. Inquiries addressed there will have the personal attention of the New England district manager, Robert L. Browne. Orders, however, should continue to be addressed to the general office of this company at 120 Broadway, New York.

The Washington Engineering Sales Co., recently organized at Seattle, and with offices in the L. C. Smith building in this city, is now Seattle representative of the Puget Sound Iron & Steel Works in the sale of its full line of Tacoma logging engines, its gray iron and steel castings, also the Overmire Steel Construction Co., steel fabricators, and the Northern Engineering Works, Detroit, in the sale of its electric cranes and foundry equipment. It also has other connections by which it can furnish rods, bolts and nuts and other steel products.

The Pacific Construction Co., the Pacific Dredging Co. and Lomas, White, Henry & McDonald, all Pacific coast industries, have combined their interests into one company with a capital of \$5,000,000. Headquarters will be in Vancouver, B. C., and a branch office will be located in Montreal, Can.

The Amco Mfg. Co., 137 South La Salle Street, Chicago, has received authority to change its corporate name to Amco Sales Corporation, and it is now installed in its new offices, 128 North Wells Street, Chicago, handling the same lines as before, namely, steel tanks, cold-rolled steel, steel sheets and gray iron castings and forgings.

The Bourne-Fuller Co., Cleveland, successor to the Upson Nut Co., announces that all sales of its products in the Eastern territory will henceforth be handled by its Eastern sales office, Whitehall Building, 17 Battery Place, New York, under the supervision of A. Schoonmaker, Eastern sales manager. This territory includes New England, eastern New York, New Jersey, eastern Pennsylvania, Delaware, Maryland and eastern Virginia, and was previously handled, to a large extent,

from the Unionville, Conn., office of the company.

Muncie Machinery & Supply Co., Muncie, Ind., has changed its name to Muncie Steel Supply Co.

The Wicaco Screw & Machine Works, Inc., Philadelphia, is now located at Stenton Avenue and Loudon Street, Wayne Junction, Pa.

## Pacific Northwest Business Quiet

SEATTLE, WASH., Nov. 25.—Local sales agents of Eastern steel mills, and also jobbers, report a continued quiet condition in trade, and say they do not look for any betterment until after the first of the year at least.

The trade here is interested in the report that several of the intercoastal-steamship lines are not in all cases strictly observing the recognized rate of \$1 per ton on iron and steel articles from New York to Seattle via the Panama Canal. It is intimated that as low as 75c. per ton has been done lately, but this cannot be verified. There are five or six large steamship lines now in this intercoastal service, and a falling off in business that would not give these lines full cargoes will probably result in some cutting in rates, if it has not already been done.

The demand for plates in this district is very dull, and the local demand for small lots is being largely supplied by local interests who bought up material at the shipyards, and are selling it in the open market at prices a good deal lower than the material can be brought here from the Eastern mills. There has been quite a heavy decline in prices named by local sales agents on sheets. On a few recent inquiries for small lots, as low as 6c. for No. 28 black, 7c. for No. 28 galvanized and 4c. for blue annealed, all at Eastern mill, have been named. Export inquiry is very dull, and comes mostly from the Philippine Islands. Nothing has come into this market from the Orient for some time.

Much lower prices are being quoted on steel bars. The local mill which makes a limited range of sizes is quoting from 4c. to 4.15c. at mill. Jobbers out of store are quoting 5c. to 5.25c., but the demand for them is very quiet.

## BOOK REVIEWS

### Books on Profession of Engineering

The following list of books and papers has been compiled for Engineering Council in response to requests, especially from parents and vocational advisers of high school boys, for information concerning the principal branches of engineering, the education and training requisite therefor, and the possibilities for making a livelihood therein. Those works which are followed by a code number may be consulted by the general public in Engineering Societies Library, 29 West Thirty-ninth Street, New York.

*Engineering as a Career*—Edited by F. H. Newell and C. E. Drayer—D. VanNostrand Co., 1916. 620 N. 443 E. (A collection of papers originally published in the *Cleveland Plain Dealer* and the *Scientific American* on various phases of engineering work.)

*Opportunities in Engineering*—Charles M. Horton—Harper & Bros., 1920. 620 H 78.

*Engineering as a Vocation*—Ernest McCullough—David Williams Co., 1911. 620 M 139 E. (Subject matter based upon a series of addresses given before technical schools and associations of engineer assistants; published for information of parents.)

*Engineering as a Career*—Percival and A. A. Marshall—P. Marshall & Co. London, 1916.

*Addresses to Engineering Students*—Edited and published by Waddell and Harrington, consulting engineers, Kansas City, Mo. Second edition, 1912. 620 W 118 A. (Purpose of book is to give engineering students a broad conception of the profession.)

*Engineering as a Profession*—Milo S. Ketchum—Bulletin of University of Colorado, 1916. No. 6. General Series No. 98.

*Engineering as a Profession*—Dean William G. Raymond, University of Iowa—University Extension Bulletin No. 3. New Series No. 73, April 11, 1914.

**Markets of the World.** A Series of Economic Maps and Statistical Abstracts of the Principal Countries of the World. Pages, 48; 8½ x 11 in. Compiled by General Drafting Co., Inc., New York. Published by the First National Bank of Boston.

Harold A. Lyon, of the commercial service department of the bank named above, is the author of this valuable work, which was prepared for the uses of that department and for a limited circulation. It consists substantially of 22 charts, bound together in leather as loose leaves. On one side of each leaf is a map of a country or group of countries, with the products of each printed upon it in red, section by section. For example, within a radius of 75 miles around Dijon, France, the products indicated are wine, coal, wheat, iron, salt, leather, cattle and dairy products. Off the coasts of the different countries the fisheries carried on are marked. On the other side of each leaf is classified information concerning the foreign trade of the country or countries shown on the map. There are statistics of exports and imports, with valuations of different classes of merchandise, the country's population and that of the principal cities, facts about industries, tariffs, consular regulations, patents and trade marks, steamship connections and the like—the whole representing a vast amount of research which is put at the disposal of the reader, compressed and ready for instant use. It is altogether a highly creditable piece of work and a noteworthy contribution to the serviceable literature of foreign trade.

**Export Register of Federation of British Industries.** Pages, 312, 7 x 9½ in. Published by Industrial Publicity Service, Ltd., Red Lion Court, London, E. C. 4.

The Federation of British Industries is a late development of business organization in the United Kingdom. It was an outgrowth of the war, its work dating from the summer of 1916. In four years it has acquired a membership of 1300, including about 200 trade

associations. The industries represented have divided themselves into 20 main groups of which No. 1 is mining and quarrying, No. 2 mechanical engineering, No. 3 shipbuilding, bridge and structural work, No. 4 electrical engineering, No. 5 iron, steel and allied trades, and so on. The federation has been active in trade affairs as affected by legislation, making its influence felt in the consideration of the anti-dumping bill, revision of railroad rates, measures for economizing fuel, schemes for co-operative housing, taxation rates, shipping defense, etc. The Export Register gives in order the members of the various groups of the federation together with their manufactures and particulars of their various agencies, with other facts that would facilitate trading with them. Another section is devoted to alphabetical listing of products and the various member firms manufacturing each. The impression given by the register and by the considerable body of matter relating to member manufacturers in various industries is that experience in the war has led to greater and more effective co-operation for the furtherance of British export trade in all lines.

The Brown & Sharpe Mfg. Co., Providence, R. I., has signalized the war service of its employees in a way that calls for comment. Its memorial is in the form of a booklet of nearly 100 pages—a remarkable specimen of the best in printing and engraving—containing portraits of the 19 boys who lost their lives, together with an account of their services, which were marked in some cases by the awards of the *croix de guerre* and the distinguished service cross. The book has been distributed, first, to the families of those who lost their lives; second, to as many as could be reached of the 911 who were in the service; third, to several thousand employees who were at work in the Brown & Sharpe shops during the period of the war. The prefatory note by Henry D. Sharpe, treasurer of the company, pays tribute to the patriotic work of the employees in the trying war years. Nearly one half of the 911 served overseas. Accounts are given in the book of some notable incidents in the service of the Brown & Sharpe men. The employees of the company subscribed \$1,400,750 to the five Government loans, besides more than \$164,000 invested in war savings stamps.

### New Books Received

**Enamels for Sheet Iron and Steel**, by J. B. Shaw, assistant ceramic chemist, Bureau of Standards. Pages 88, 7 x 10 in. Published by the Government Printing Office, Washington, as Technologic Paper No. 165, Bureau of Standards.

**Industrial and Social History of England**, by Edward P. Cheyney. Pages 366, 5½ x 7½ in. Published by the MacMillan Co., 6464 Fifth Avenue, New York.

### Operations of Alan Wood Iron & Steel Co. Illustrated

The Alan Wood Iron & Steel Co., Philadelphia, has published a beautifully illustrated book showing the various operations in the manufacture of pig iron, plates and sheets at its plants at Swedeland, Ivy Rock and Conshohocken, Pa. All illustrations are in two colors. Two of the illustrations are reproduced from aerial photographs of the plants. A photograph of the founder, Alan Wood, is accompanied by the following brief text as to the origin of the business: "The earliest record of the Wood family in the iron business dates back to the old 'Hammer Hollow' forge near Strafford, Pa., which was operated by James Wood. Subsequently his son, Alan Wood, operated sheet mills at Wooddale, Del., in 1826. His sons, Alan Wood, Jr., W. Dewees Wood (father of Richard G. Wood, now chairman of the board of Alan Wood Iron & Steel Co.), Howard Wood and Thomas Wood were identified with the business." Photographs of Richard G. Wood, chairman, and Jonathan R. Jones, vice-chairman, are printed together with the names of officers, directors and department managers of the company.



# Machinery Markets and News of the Works

## MORE INQUIRY FOR TOOLS

### Buying Is Limited, However—Purchases Put Off Until New Year

#### November the Leanest Month of the Year in Point of Sales, Tool Builders Report

Actual buying of machine tools is very light, but there is a fair amount of inquiry before the trade, most of which, it is announced by prospective buyers, will not be acted upon until after the first of the new year.

November was the leanest month of the year in volume of business booked by the machine tool trade. As a result of the steadily declining business of the past few months more machine-tool plants are restricting production to a small percentage of normal.

## New York

NEW YORK, Nov. 30.

While the machine-tool trade has little expectation of any revival of buying in the East this year, it looks forward to a possible resumption shortly after the first of January. This expectation is based largely on the statements of prospective buyers that they will take no action on pending inquiries until after the inventory period. Several railroad lists are being held up until after Jan. 1, but the purchasing departments of several Eastern roads intimate that their inquiries will surely be issued early in the new year.

The past week has brought forth no new developments except a greater number of small inquiries, usually for single machines. The amount of business being booked, however, is very small. With some dealers actual sales in November were not more than 10 or 15 per cent of what has in the current year been considered a normal business. Some machine-tool manufacturers, particularly those whose machines are largely used in automotive industries, have done practically nothing this month. The very severity of the slump in orders, however, is taken by some as an indication that the period of the depression will be short.

A large number of inquiries is in the market, but few orders are reported placed. Because of improved labor conditions and slightly lower costs, at least one manufacturer of locomotive cranes has reduced prices about 15 per cent and some crane builders are protecting buyers against possible reductions in prices in the spring. A manufacturer of hand power cranes is now quoting 15 per cent less. Among current inquiries is one from Amplex, Inc., 6 West Thirty-second Street, for a 40-ton, 60-ft. span overhead traveling crane and two hand-power cranes for export to Cuba. Thomas E. Murray, Inc., 55 Duane Street, New York, is receiving bids on a 10-ton hand power crane for the United Electric Light & Power Co., New York.

Among recent sales are: Shepard Electric Crane & Hoist Co., 3-ton, 17-ft. 11-in. span overhead traveling crane to Ross Meehan & Co., Chattanooga, Tenn.; New Jersey Foundry & Machine Co., a 5-ton hand power crane to I. W. Jones & Co., Milton, N. H.

The Hudson Tire & Rubber Co., Yonkers, N. Y., manufacturer of automobile tires, has awarded a contract to James Mitchell & Co., 76 Montgomery Street, Jersey City, N. J., for a new three-story, reinforced-concrete plant, 120 x 120 ft., to cost about \$400,000, including machinery. A power plant will also be constructed. The Osborne Engineering Co., 2848 Prospect Avenue, Cleveland, is architect.

The Pattern & Foundry Equipment Corporation, 132 Nassau Street, New York, has increased its capital from \$10,000 to \$50,000.

Fanning, Edwards & Gagen, Inc., Riverhead, L. I., has been incorporated with a capital of \$150,000 by E. S. and

One of the new inquiries before the trade in the Central West is a list issued by the Lafayette Motor Car Co., Indianapolis, and it is expected that purchases will be made early next year. The Ohio Locomotive Crane Co., Bucyrus, Ohio, which recently issued an inquiry for 53 machines, is expected to place orders soon. Purchases of 21 tools inquired for by the American Steel & Wire Co., Cleveland, have been deferred until early next year. The Wellman-Seaver-Morgan Co., Cleveland, is getting quotations on tools for the manufacture of tractors, but may not buy for some time.

The general situation in the market is that, while there is a fair volume of prospective buying, it is apparent that few, if any, purchases of importance will be made until after the inventory period.

Railroad inquiries are being held back until 1921, but a few machines are being purchased for urgent requirements. Several large lists may be issued by Eastern roads about Jan. 1.

I. T. Edwards and J. T. Fanning, Riverhead, to manufacture farm implements, airplane parts, and other iron and steel products.

The Aeolian Co., Aeolian Hall, West Forty-second Street, New York, manufacturer of player piano mechanisms, etc., is considering the erection of a new three-story plant at Aeolian, near Garwood, N. J., to cost about \$70,000. Hollingsworth & Bragdon, 17 West Forty-fifth Street, New York, are architects.

The Joseph Baker Sons & Perkins Co., 233 Broadway, New York, engineer, has increased its capital from \$100,000 to \$500,000.

The Claussen Tube Works, 25 Bay Street, Brooklyn, has filed plans for a new one and one-half story plant at 518-26 Columbia Street, 88 x 100 ft., to cost about \$20,000.

The Jewett Machine Co., Long Island City, N. Y., has been incorporated with a capital of \$40,000 to manufacture automobile and motor truck parts, engines, etc. It has leased a building to be erected on South Washington Place, comprising about 9000 sq. ft. for its proposed works. W. A. Perry, E. M. Ketterle and W. O. Lundgren are the incorporators.

The United Electric Light & Power Co., 130 East Fifteenth Street, New York, will soon take bids for a new three-story plant at 115 West Twenty-seventh Street, to cost about \$170,000.

The E. B. T. Corporation, Lloyd, N. Y., has been incorporated with a capital of \$150,000 by E. Bachelet, J. Schuhle and R. Luthi, Kingston, N. Y., to manufacture electrical and mechanical apparatus.

The Ward-La France Truck Corporation, Elmira, N. Y., manufacturer of automobile trucks, has increased its capital to \$10,300,000. It is affiliated with the American-La France Co., manufacturer of motor-driven fire equipment.

A power house to cost about \$42,000 will be erected by the Department of Public Welfare, Municipal Building, New York, at the Sea View Hospital, West New Brighton, S. I.

The American Blower Co., 141 Broadway, New York, manufacturer of mechanical draft equipment, fans, motors, etc., a New York corporation with plants at Green Island, N. Y., and Detroit, has increased its capital from \$1,500,000 to \$3,750,000.

Gerardus Harrison, architect, 103 Park Avenue, New York, will make all purchases for the proposed new brick and steel foundry to be erected by the Lima Foundry & Machine Co., Lima, Ohio, affiliated with the Wheatly Co., Lima. Preliminary plans are being prepared.

The Dressel Mfg. Corporation, New York, has been incorporated with a capital of \$800,000 by F. C. Myers, J. H. Strange and F. H. Gregory, 142 Manhattan Avenue, to manufacture hardware, tools, etc.

The Swan & Finch Co., 522 Fifth Avenue, New York,



operating oil refineries at Bayonne, N. J., has increased its capital from \$2,000,000 to \$5,000,000.

The General Motor Service Corporation, Farmingdale, L. I., operating a local automobile machine and service works for parts manufacture, repairs, etc., has increased its capital from \$7,500 to \$300,000.

The Morris Automatic Life Safety Buffer Co., New York, has been incorporated with a capital of \$100,000 by A. H. Bialon, R. and S. Spiro, 373 Seneca Avenue, Brooklyn, to manufacture automatically operated safety equipment.

The Acme Die Casting Corporation, 87 Thirty-fifth Street, Brooklyn, has increased its capital to \$275,000.

The Interstate Automobile Coach Works, 1926 Broadway, New York, has leased a building at 18-20 West Sixty-third Street, for the manufacture of parts and repair operations.

The Electric City Spark Plug Co., Schenectady, N. Y., has been incorporated with a capital of \$100,000 by Mark H. and John W. Gleason, and Joseph W. Pearson, Schenectady, to manufacture spark plugs and other ignition equipment.

The Warren-Nash Motor Corporation, 1928 Broadway, New York, has acquired a building at 229-33 West Sixty-fourth Street, on site 100 x 100 ft., for a new automobile service and repair works to be used for the expansion of the present building at 18 West Sixty-third Street.

The Chevrolet Motor Co., Broadway and Fifty-seventh Street, New York, is arranging for the resumption of operations at its plant at Tarrytown, N. Y., early in December. Under normal operations, the works have an output of about 250 automobiles per day, and it is proposed to operate for the present at a capacity of 100 cars per day.

The Hart Bell Mfg. Co., 1926 Broadway, New York, has been incorporated, with a capital of \$1,250,000, to manufacture automobile jacks and similar equipment.

The Atlas Portland Cement Co., 30 Broad Street, New York, has called a special meeting of directors Dec. 15, to approve an increase in capital from \$14,000,000 to \$23,000,000. It has plans under way for the construction of a new plant in the Lehigh Valley district, in the vicinity of its present works at Northampton and it is understood that bids for a number of buildings will be asked at an early date.

The Steel Industries Corporation, 261 Broadway, New York, manufacturer of metal products, has called a meeting of stockholders on Dec. 2 to approve a proposition for the dissolution of the company.

The American Taximeter Co., 22 West Sixty-first Street, New York, has acquired property in the vicinity of Queens Boulevard and Greenpoint Avenue, Long Island City, and is reported to be planning for the erection of new works.

Strauss & Co., 306 West Fifty-second Street, New York, manufacturer of metal display signs, has leased property at 621-23 West Forty-second Street for the establishment of a new plant, to include electric repair and construction department.

The Standard Oil Co. of New Jersey, 26 Broadway, New York, has increased its capital stock to \$110,000,000.

The Western Electric Co., 195 Broadway, New York, has leased the one-story building at 505 St. Mark's Avenue, Brooklyn, totaling about 20,000 sq. ft., for general works service.

The American Stamping Co., Elizabeth, N. J., has been incorporated with a capital of \$200,000 by Elwood W. Phares, Herbert A. Hills and George M. Seaton, 309 Pine Street, to manufacture stamped metal goods, plating materials, etc.

The Delaware, Lackawanna & Western Railroad, Hoboken, N. J., has commenced the construction of additions to its shops and engine house at Port Morris, N. J., to cost about \$150,000.

The Collins Puncture Proof Tube Co., Hackensack, N. J., has been incorporated with a capital of \$200,000 by William B. Mackey, Jr., Joseph Kinzley, Jr., and James W. Mercer, Hackensack, to manufacture automobile tires and tubes.

The Eastern Halladay Motors Corporation, Union, N. J., has been incorporated with a capital of \$125,000 by James A. and Charles A. Iorio and Isador Haber, 17 Bergenline Avenue, to manufacture automobile parts and operate a general machine repair works.

The War Department, Washington, is arranging for the establishment of an aircraft manufacturing plant at Hammononton, N. J., utilizing the former Government shell-loading works known as the Amatol Arsenal, said to represent an investment of close to \$20,000,000. A number of structures will be taken over and equipped for general manufacture and it is understood that a large machine works is proposed for general repair operations.

The Joseph Dixon Crucible Co., Monmouth Street, Jersey City, N. J., manufacturer of graphite crucibles, etc., has increased its capital from \$2,000,000 to \$6,000,000.

The entire equipment at the former plant of the International Arms & Fuse Co., Grove Street, Bloomfield, N. J., will be sold by the Brown Hunkele Corporation, 12 Mechanic Street, Newark, manufacturer of machinery, electric motors, etc., and which has taken over the equipment from the General Motors Corporation, Detroit, now owner of the plant. The sale includes machine tools, electrical apparatus, air compressors, blowers, pumps, pipe, fittings, etc., valued at \$100,000. The General Motors Corporation will occupy the plant with its subsidiaries.

The Board of Education of the Essex County Vocational Schools, 316 Essex Building, Newark, will receive bids up to 4 p. m., Dec. 8, for electrical equipment for the Girls' Vocational School, Franklin Street, Bloomfield, N. J. Robert O. Beebe is director.

The R. G. Smith Tool & Mfg. Co., 315 Market Street, Newark, has filed notice of organization to manufacture tools, machine parts, etc. Robert G. Smith, 209 Park Place, Irvington, N. J., heads the company.

The Baxter Plating Works, 353 Mulberry Street, Newark, has leased about 7,500 sq. ft. at 109 Oliver Street, for the establishment of new works. Hugh Baxter is president.

The Stanwood Rubber Co., Inc., Newark Avenue, Elizabeth, N. J., manufacturer of automobile tires, and the Hardman Rubber Corporation, Fulton Street, New Brunswick, N. J., manufacturer of similar products, are arranging for a consolidation of plants and interests. Both companies are in the hands of receivers, Edward P. Kirkpatrick, New Brunswick, acting for the first noted, and Edmund H. Hayes, of the same city, for the Hardman company.

## New England

BOSTON, NOV. 29.

November was the leanest month of 1920 for the majority of local machine tool dealers and December will open with comparatively little business in sight. The recent purchase of equipment at the auction sale of the Nelson Blower & Furnace Co., South Boston, by a number of industrial concerns removed a large percentage of live prospects. The Saco-Lowell Shops, however, are inquiring for several individual production tools. Some machine tool houses are looking for business from the General Electric Co., West Lynn, Mass., possibly in December or soon after the first of the year, but that company is doing very little buying compared with its activities a few months ago. It is, however, working on a small list of equipment on which it seems in no hurry to close.

The Providence Engineering Corporation, Providence, R. I., has purchased a used 36-in. planer, and is in the market for a radial and two high speed drills. The United States Cartridge Co., Lowell, Mass., has sold a number of war production Sebastian, South Bend and other makes of lathes to the Grover File Co., Nashua, N. H. The Chase-Shawmut Co., Inc., Newburyport, Mass., electrical material, covered on an automatic thread miller and several other machine tools through the United States Salvage Board, and a few individual sales of lathes, shapers and upright drills, mostly used tools, are reported. E. G. Baldwin, Gardner, Mass., formerly associated with a chair manufacturer, is establishing a small experimental shop and is in the market for tool room machinery, and Austin & Doten, Boston, metals, has made inquiries on a shear.

The demand for small tools continues quiet and Boston mill supply houses intimate a further revision in prices on reamers, drills, hack saws and fine tools is in the making. Less activity is noted at plants and the number of those working with reduced forces or on shorter weekly schedules is increasing. A large number of plants were closed from Nov. 24 to Nov. 29, advantage of the holiday being taken.

The Kingsbury Mfg. Co., Keene, N. H., is installing equipment preparatory to manufacturing a two spindle automatic ball bearing sensitive drilling machine. Active production of these machines probably will not start until spring.

Upon the completion of its Butterfield, Vt., plant some time next month, the Union Twist Drill Co., Athol, Mass., will be in the market for machinery.

Owing to uncertain business conditions several New England building projects have been held up until spring, including a two-story addition, 25 x 125 ft., to the Revere Rubber Co.'s plant, Providence, R. I., and a \$250,000 plant for the American Can Co., South Boston.

The Berkshire Stone Products Co., Pittsfield, Mass., has awarded contract for the construction of a new plant to cost approximately \$100,000.

The Diamond Match Co., Springfield, Mass., will build

several additions to its plant, including a two-story, 76 x 81 ft. power house.

The Hartford Electric Light Co., Hartford, Conn., will build a four-story, 200 x 320 ft., steam-electric power station, at an estimated cost of \$2,815,000.

The Bullock Machinery Exchange, 528 Grosvenor Building, Providence, R. I., advises that it has not been organized recently to manufacture machine parts, but its business is to buy and sell textile machinery on a commission basis.

The New England Products Co., Inc., Mianus, Greenwich, Conn., has been incorporated with a capital of \$300,000 by B. L. Marsh, G. G. Knowles and F. C. Hoyt, 307 Atlantic Street, Stamford, Conn., to manufacture machinery, electrical equipment, etc.

The Crescent Fire Arms Co., Norwich, Conn., has increased its capital from \$100,000 to \$175,000.

The General Fire Extinguisher Co., Providence, R. I., has awarded a contract to the C. I. Bigney Construction Co., Hopkin Homestead Building, for a two-story addition at its Auburn, R. I., plant, 40 x 60 ft.

The Jarvis Engineering Co., 261 Franklin Street, Boston, manufacturer of grate bars and kindred products, has filed plans for a one-story factory at 51 Ellery Street to cost about \$15,000.

The Belpedio Co., 925 Main Street, Bridgeport, Conn., manufacturer of talking machines and parts, has plans under way for new works at Devon, Conn., to cost about \$250,000, including machinery. The main building will be of brick, 60 x 200 ft. Harry E. Koerner, Bridgeport, is architect.

The Morgan Construction Co., 15 Belmont Street, Worcester, Mass., manufacturer of gas producers, cranes, machinery, etc., will build a one-story machine shop addition, 50 x 50 ft., on Crescent Street, including improvements in present building, to cost about \$30,000.

The Interstate Foundries Corporation, Boston, has been incorporated with a capital of \$150,000 by Herbert Austin, R. B. Delano and Junius P. Sokoll, 179 Shawmut Street, Fall River, Mass., to manufacture iron and steel castings.

The Eagle Lock Co., Terryville, Conn., manufacturer of locks, builders' hardware, etc., will increase its capital from \$1,000,000 to \$2,000,000.

The New Bedford Shuttle Co., 24 Elm Street, New Bedford, Mass., manufacturer of textile equipment, has commissioned Leary & Walker, engineers, Times Building, to prepare plans for its new three-story plant, 60 x 155 ft., at Rockdale Avenue and Maxfield Street.

The W. J. McNellis Co., Inc., Waterbury, Conn., has been incorporated with a capital of \$75,000 by D. J. Stevens, J. J. and W. J. McNellis, 196 Grand Street, to manufacture electrical equipment.

The Donnelly Machine Co., Inc., Brockton, Mass., has been incorporated with a capital of \$100,000 by John F. Donnelly, L. M. Kelly and Ernest S. Johnson, to manufacture machinery and tools.

J. L. Lucas & Son, Inc., 7 Fox Street, Bridgeport, Conn., machinery and parts, has increased its capital from \$25,000 to \$75,000.

The Hub Steel & Iron Works, Boston, has been organized to manufacture iron and steel products. Samuel Waxman, 41 Way Street, heads the company.

The Hartford Twist Drill Co., Hartford, Conn., has been incorporated with a capital of \$250,000 by J. S. Richard, 32 Morningside Avenue, and K. M. Larkum, 335 Linnmoore Street, to manufacture twist drills and other metal-cutting tools. It will commence business with an active capital of \$130,700.

The Bureau of Fisheries, United States Government, Washington, is taking bids for a new one-story machine shop at Woods Hole, Mass.

The Boston & Lawrence Bolt Co., Boston, has been organized to manufacture bolts, nuts, etc. Joseph J. Hassett, 68 Devonshire Street, heads the company.

The Preston Cast Die Corporation, Boston, has been incorporated with a capital of \$500,000 by Marshall V. Preston, S. D. Converse and Alfred B. White, 85 Devonshire Street, to manufacture dies and other mechanical specialties.

The J. & C. Portable Rosser Co., Washburn, Me., has been incorporated with a capital of \$100,000 by Enoch W. Higgins, Herbert L. Crouse and Fred W. Crane, to manufacture bark removing machines and other lumber-working machinery.

The T. L. Harkins Machine Co., 44 Farnsworth Street, Dorchester, Mass., is considering the erection of a new plant on Cambridge Street, Allston, Mass., two stories and basement, of reinforced concrete, 50 x 100 ft. Thomas L. Harkins is president.

## Chicago

CHICAGO, Nov. 29.

The local market has come into prominence because of the appearance of a few attractive inquiries, notably the long list of the Santa Fe, recently published in this column, but actual buying has been limited. A leading dealer found his sales record of October the smallest of any month since 1914 and at present it seems probable that a further decline will be noted when November figures are totaled. This situation may not hold true of all sellers, but generally current business is exceptionally light and consists of scattered orders for one or two machines.

The Waukesha Motors Co., Waukesha, Wis., is in the market for a cylinder boring machine, four-spindle drilling machine, eight-spindle drilling machine, radial drill, boring mill, 11 special production machines, and miscellaneous equipment. The Waukesha company recently took a contract to supply motors for tractors to be manufactured by the International Harvester Co., and the equipment is needed in connection with this work. The International Harvester Co., is inquiring for a number of thread milling and gear generating machines, presumably for its Milwaukee plant. The Nash Motors Co. bought two semi-automatic turret lathes for its Milwaukee plant. The parent works of the Nash company at Kenosha, Wis., was recently shut down, but the new plant at Milwaukee, it is reported, will soon go ahead with the production of a lighter model of automobile. A revival in the motor truck industry is indicated by the fact that the American Axle Co., Barton, Wis., has booked a large order for rear axles for trucks. It will start work on the contract Feb. 1.

Joseph T. Ryerson & Son, machinery division, Chicago, has issued an inquiry for about 30 second-hand machine tools.

The Paltridge Metal Equipment Co., 341 North Crawford Avenue, Chicago, has secured a permit for a two-story addition, 40 x 124 ft., to cost \$15,000.

Jacob Press's Sons, manufacturers of automobile bodies, 300 North Halsted Street, Chicago, have let contract for a one-story plant, 126 x 190 ft., at 3318-36 Normal Avenue, to cost \$45,000.

Antonina D'Andrea, 521 West Twenty-sixth Street, Chicago, has let contract for a two-story macaroni factory addition, 25 x 50 ft., to cost \$3,000.

The George W. Moore Co., manufacturer of mill supplies, 2148 Fulton Street, Chicago, has let contract for a one-story plant, 120 x 144 ft., to cost \$50,000.

The National Plumbing & Heating Supply Co., 6044 South State Street, Chicago, has let contracts for a one and two-story plant, garage and office, 200 x 375 ft., at 201-209 East Sixty-third Street, to cost \$250,000.

The Superior Washing Machine Co., DeKalb, Ill., which had prepared plans for a foundry and warehouse to cost \$600,000, has indefinitely postponed the erection.

The Steel Utilities Corporation, 250 Mill Street, Rockford, Ill., has been incorporated with \$5,000 capital stock by Sidney A. Shoop, John F. McCanna, Herbert B. and G. O. Morton to manufacture electrical, wood and metal products.

The Moline Engine Co., Seventh Street, Moline, Ill., has been incorporated with \$2,930,000 capital stock to manufacture machinery, engines, implements, etc. The incorporators include R. S. Tuthill, Jr., C. B. O'Neil, Frank P. Hage.

The Jackson Auto Radiator Co., 668 West Washington Street, Chicago, has been incorporated with \$50,000 capital stock to manufacture automobile radiators, parts, machinery, etc. The incorporators include M. Emmer, A. J. Shatan, William Nathanson.

The International Baling & Binding Co., 938 North LaSalle Street, Chicago, has been incorporated with \$40,000 capital stock by L. J. Carlin, R. A. E. Boppelt, David H. Brill, to manufacture machinery, etc.

The Kingsbury Corporation, 1819 Kingsbury Street, Chicago, has been incorporated by I. Von S. Spieters, Albert Goetz and William A. L. Schaefer to manufacture boiler room specialties.

The Sanitary District of Chicago, 900 Harper Building, Chicago, has let contract for a power house at 128-168 East 125th Street, to cost \$530,000.

The Galesburg Malleable Castings Co., Galesburg, Ill., sustained a loss, estimated at \$200,000, when its plant was destroyed by fire recently.

The Watts Laundry Machinery Co., St. Joseph, Mich., contemplates the construction of a new plant next spring.

The E. C. Meier Lubricating Co., Wichita, Kan., manufacturer of oil field supplies, has had plans drawn for a one-story plant.

The E. A. Baumbach Mfg. Co., 810 West Lake Street,

Chicago, plans to erect a foundry, 50 x 150 ft., to cost \$15,000.

M. Block & Son, 1123 Newberry Avenue, Chicago, have completed plans for a new factory, 48 x 100 ft., at 1120 Newberry Avenue, for the manufacture of sheet metal specialties, estimated to cost about \$50,000. Dubin & Eisenberg, 139 North Clark Street, are architects.

The Hannifon Mfg. Co., 621 South Koman Avenue, Chicago, manufacturer of chucks and similar products, will hold in abeyance the erection of its proposed two-story plant, 90 x 160 ft., estimated to cost about \$200,000, including equipment. M. J. Hannifon is president.

The Northern Pacific Railroad Co., Marquette Avenue, St. Paul, Minn., is arranging an appropriation for extensions and betterments in locomotive and car shops. It is proposed to expend about \$645,000 for shop buildings, engine houses, and general equipment; \$475,500, for machine shop equipment, and \$500,000 for cranes, hoists, pile drivers and other heavy machinery.

The International Harvester Co., Chicago, has plans under way for the erection of a new machinery and tool distributing plant at New Orleans, La., estimated to cost about \$3,000,000 including equipment.

The Denver & Salt Lake Railroad Co., Ideal Building, Denver, Colo., has plans under way for rebuilding its car and locomotive shops, 90 x 250 ft., recently destroyed by fire. The work is estimated to cost in excess of \$500,000 including machinery.

The City Council, Owatonna, Minn., has plans under way for a new municipal electric light and power plant to cost about \$475,000 with machinery. Toltz, King & Day, 1410 Pioneer Building, St. Paul, Minn., are engineers. C. J. Servatius is city clerk.

In connection with the purchase of the Denver & Rio Grande Railroad, Denver, Colo., by the Western Pacific Railroad, Salt Lake City, Utah, plans are being perfected for extensions and equipment to total about \$12,000,000. Of this amount, about \$3,000,000 will be used for the construction of new shops at different points.

## Philadelphia

PHILADELPHIA, Nov. 29.

Oechsle Brothers, 1435-37 North Thirty-first Street, Philadelphia, have filed plans for a one-story machine shop addition, 30 x 200 ft.

The American Water Softener Co., 1011 Chestnut Street, Philadelphia, manufacturer of filters, water conditioning equipment, etc., has taken title to the factory at the corner of Fourth Street and Lehigh Avenue, for manufacturing.

The American Insulating Machinery Co., Fairhill and Huntingdon streets, Philadelphia, manufacturer of special machinery and parts, has increased its capital from \$50,000 to \$200,000.

The Morris Truck & Wheel Co., Seventy-fifth Street and Island Road, Philadelphia, has awarded contract to the Robbins Contracting Co., Lafayette Building, for a one-story addition at Forty-second Street, to cost about \$25,000.

The Mattice Engineering Co., Philadelphia, has been incorporated with a capital of \$25,000 to manufacture mechanical products. Pelham Harding, 205 North Fourth Street, is treasurer.

Louis Goldberg, Philadelphia, has filed plans for the erection of a new one-story machine shop at 1603 North Franklin Street. The J. A. Willners Co., Witherspoon Building, has the contract.

The Atlas Powder Co., Harrison Building, Philadelphia, has acquired the former factories of S. B. & B. W. Fleisher, manufacturers of yarn, at the foot of Rector Street, Manayunk district. The property comprises two main buildings, five and ten stories, extending about two city blocks, and aggregates 200,000 sq. ft. in area. It has been held at \$250,000. No announcement has as yet been made by the new owner regarding date of occupancy.

The Self-Generating Gas Engine Co., Philadelphia, manufacturer of gas engines and parts, has increased its capital to \$50,000.

The Reyburn Mfg. Co., Twenty-third and Allegheny streets, Philadelphia, has awarded contract to the William Steele & Sons Co., Sixteenth and Arch streets, for its proposed new tag and label manufacturing plant at Thirty-second and Allegheny streets, to cost \$420,000, including machinery.

The John E. Thropp's Sons Co., Lewis Street, Trenton,

N. J., manufacturer of rubber-working machinery, mechanical stokers, etc., has acquired property in the vicinity of Fair Street for future extensions.

The Electric Power Equipment Corporation, Trenton, N. J., has been incorporated with a capital of \$25,000 under Pennsylvania laws, to manufacture electrical apparatus. F. W. Dinsmore, 709 Greenwood Avenue, is treasurer.

The Auto Car Co., Ardmore, Pa., manufacturer of motor trucks, has increased its capital to \$4,839,600.

The Phoenix Iron Works, Mercer Street, Meadville, Pa., has awarded contract to the H. K. Ferguson Co., Euclid Avenue, Cleveland, for a one-story building, 50 x 300 ft., and a five-story structure, 40 x 100 ft., estimated to cost about \$200,000.

The Danville Iron & Steel Corporation, Danville, Pa., has increased its capital from \$3,000,000 to \$6,500,000.

The Smith Burner & Oil Co., Buffalo, has awarded a contract to Butz & Clader, Allentown, Pa., for a one-story branch works, 50 x 125 ft., at Walnut and Front streets, Allentown.

Following its recent purchase of the plant and business of the Arnold-Creager Co., New London, Ohio, manufacturer of automatic brick-making machinery, the Lancaster Iron Works, Lancaster, Pa., is arranging for the removal of the plant to its local works. James P. Martin will be manager.

The Lycoming Foundry & Machine Co., Oliver Street, Williamsport, Pa., is having plans prepared by F. Arthur Rianhard, architect, Masonic Temple Building, for the erection of a one-story power house, 50 x 100 ft., to cost about \$30,000.

## Pittsburgh

PITTSBURGH, Nov. 29.

No improvement is noted in the machine tool business in this district. While a fair amount of interest is apparent, there is a marked inclination by buyers to postpone purchases until after the first of the year. Much of the business in this section originates in the iron and steel industry and just now considerably less than the normal amount is before the trade. Several promising crane orders are pending, but placements are few and inquiries are not coming out freely.

The National Gear & Truck Wheel Co., Fulton Building, Pittsburgh, John H. Nasson, head, is completing plans for a new one-story plant at Vanport, Pa. George O. Rogers, Penn Building, is architect.

The Penn Machine Co., Pittsburgh, has been incorporated with a capital of \$100,000 to manufacture machinery and tools. L. B. Blair, 808 Devonshire Street, is treasurer.

The Fort Pitt Steel & Iron Works, Pittsburgh, is being organized by George L. Redpath and L. J. Bloch, to manufacture machinery and other iron and steel products. Louis J. Bloch, 513 Berger Building, represents the company. Application for a State charter will be made early in December.

The Girson Auto Body Construction Co., Pittsburgh, specializing in the manufacture of automobile truck bodies, etc., has removed its plant to 3518 Fifth Avenue, where larger space is provided. It is proposed to increase production and include the operation of repair works. Edward Girson is head.

The R. J. Burns Co., Pittsburgh, is being organized by R. J. and M. B. Burns and William G. Elighenmiller, to manufacture automobile parts and equipment and to operate a general machine repair works. Application will be made for a State charter. Frank S. Delp, 1737 Oliver Building, represents the company.

The Commercial Drop Forge Co., Warren, Pa., recently incorporated with a capital of \$240,000 to manufacture drop forgings and other iron and steel products, has begun construction of its plant, the initial works to comprise three main buildings to cost about \$130,000 with equipment. W. Treat Davidson is president.

The Superior Basic Brick Co., Pittsburgh, is being organized by H. B. Groninger, William M. Hetzler and James E. Shaeffer to manufacture refractory products, including fire brick specialties, ladle linings, etc. Application will be made for a State charter. Sterrett & Acheson, 1927 Oliver Building, represent the company.

The Beaver Building Block Co., Monaca, Pa., will take bids early in December for a one-story works, 60 x 100 ft., to cost about \$30,000. J. F. Bontempo is president.

The Virginia Electric & Machine Works, Charleston, W. Va., has increased its capital from \$50,000 to \$100,000.



Fire, Nov. 17, destroyed a portion of the plant of the Wheeling Steel Castings Co., Warwood, W. Va., with loss estimated at about \$35,000. Plans for rebuilding are being considered.

The Vernon Coal Co., Williamson, W. Va., recently organized, is planning for the installation of a tramway system and other mechanical equipment at its properties in the vicinity of Naugatuck, W. Va. R. G. Bailey, president and manager, will act also as consulting engineer for the company.

The Mutual Electric & Machine Co., Wheeling, W. Va., a Michigan corporation, has increased its capital from \$100,000 to \$500,000.

The J. C. Boggs Motor & Light Co., Lewisburg, W. Va., has been incorporated with a capital of \$50,000 by J. C. Boggs and John A. Littlepage, Lewisburg, and W. A. Charleston, Hinton, W. Va., to manufacture automobile lighting equipment and other accessories.

The Union Explosives Co., Clarksburg, W. Va., has been organized with a capital of \$500,000 to consolidate the Long Powder & Supply Co., Empire Powder Corporation and Ashcraft Transfer Co. It will maintain and operate the plants of the different companies at LeRoy, N. Y.; Easton, Pa.; Rochester, N. Y.; Morgantown and Wilsonburg, W. Va. Headquarters will be at Clarksburg. J. Edgar Long is president and treasurer, and John A. Washington, vice-president and secretary.

The West Penn Power Co., Hartje Building, Pittsburgh, has completed plans for an addition to its power plant at Beechbottom, W. Va., to cost about \$40,000.

## Buffalo

BUFFALO, Nov. 29.

The Tube Manifold Corporation, Buffalo, recently incorporated with a capital of \$100,000, has acquired property formerly occupied by the Curtiss Aeroplane & Motor Co., Curtiss Street, for the establishment of its new plant. The building provides about 15,000 sq. ft. of floor space, and will be equipped for the manufacture of tube manifolds of steel, brass, copper, aluminum, etc. It is proposed to have the plant ready for manufacture early in January. Officers of the new company previously were connected with the Standard Metalware Co., Thompsonville, Conn., and include Louis W. Sumner, president; A. F. Riedl, vice-president, and Charles D. Mathews, secretary and treasurer.

Property of the J. P. Devine Co., 1374 Clinton Street, Buffalo, manufacturer of vacuum drying apparatus, will be sold on Dec. 10 by Francis P. Garvan, alien property custodian.

The Queen City Tool Co., Buffalo, manufacturer of machinery and tools, has increased its capital to \$100,000.

The Erie Service Co., Inc., Buffalo, has made application to the City Council to construct an automobile truck service building and terminal on Elk, near Chicago Street. It will be one-story brick, 68 x 175 ft., and will be used exclusively for parts manufacture and repair work. G. Chester Illig is vice-president.

The M. & M. Drawn Steel Co., Erie, Pa., has filed notice of change of name to the Erie Drawn Steel Co.

The Dunlop Tire & Rubber Corporation of America, Buffalo, will begin production at its new plant on the Niagara River, near Buffalo, early in the coming year, specializing in the manufacture of cord pneumatic tires and tubes for automobiles and motor trucks, including solid tires for motor trucks. The plant covers an aggregate of 35 acres and will have a daily capacity of about 12,000 tires per day. Perry D. Saylor is vice-president and general manager.

The International Time Recording Co., Binghamton, N. Y., manufacturer of time recording devices, has increased its capital to \$2,075,000.

The Stanley Steel Welded Wheel Corporation, 40 Court Street, Boston, manufacturer of steel disk wheels, has filed plans for the first unit of its new plant at North Tonawanda, N. Y., 100 x 200 ft. The company has a site of about 20 acres on the Walck Road. It is proposed to have the initial works ready for service early in February and is estimated to cost about \$100,000. J. T. McMurray is president.

The Jamestown Panel Co., 50 Steele Street, Jamestown, N. Y., has increased its capital from \$60,000 to \$300,000.

The Westcott Rule Co., 8 Bayard Street, Seneca Falls, N. Y., has broken ground for its two-story addition, 75 x 225 ft.

The Federal Detachable Rim & Wheel Corporation, Syracuse, N. Y., has been incorporated with a capital of \$2,000,000 to manufacture metal automobile rims, wheels, etc. Lucius G. Lacy, Syracuse, is the principal incorporator.

## Detroit

DETROIT, Nov. 29.

The machine tool market continues dull, although a few single orders are reported. It is believed that considerable business is in prospect, owing to the slow but apparent improvement in the industrial situation.

The Chicago Pneumatic Drill Co. is removing its rock drill plant from 864 East Seventy-second Street, Cleveland, to its Boyer Pneumatic Hammer plant at 1301 Second Boulevard, Detroit. Its Little Giant air drill plant at 1241 East Forty-ninth Street, Cleveland, remains unchanged.

According to a statement issued recently, the Dodge Brothers production during October was the largest in the history of the company. During the last 90 days the output has not been below 550 cars a day, or 48,500 in three months.

The Congdon-Russell Co., which makes automobile bodies, has started operations in its new three-story plant at Medbury Avenue and Russell Street, Detroit. It has a capital stock of \$250,000 and the directors are A. G. Congdon, J. W. Russell, C. H. Guider, George W. Muehl and J. J. Jacobson.

The Vulcan Motor Axle Co., Detroit, organized last spring to manufacture automobile axles, and which is now in production, reports that its business outlook is good despite the unsettled conditions, all obligations having been met promptly. It is stated that the company is figuring on new business aggregating several million dollars, but to obtain this it will be necessary to add to its line of axles other sizes than those originally contemplated. It will require additional equipment, and therefore the directors have decided to offer for sale about 750 shares of 8 per cent cumulative preferred stock, of a par value of \$100 each. With each share of preferred the subscriber receives as bonus two shares of common.

New machinery will be installed by the Lansing Co., Lansing, Mich., for the manufacture of shop trucks.

The Quick Change Auto Rim Co., Pontiac, Mich., has been incorporated with a capital stock of \$10,000 to manufacture improved plates, links and accessories for quick change automobile rims. George Sifkovitz and Sprydon Balanes, Pontiac, and John Laskovich, Detroit, are the incorporators.

The Crary Machine Co., Benton Harbor, Mich., has increased its capital stock from \$50,000 to \$100,000, to take care of additions and equipment.

The Standard Malleable Iron Co., Muskegon Heights, Mich., has increased its capital from \$250,000 to \$500,000.

The Ideal Foundry Co., Grand Rapids, Mich., has taken out a permit for an addition to cost \$5,000.

The Northrup Lock Co., Detroit, has been incorporated with a capital of \$200,000 by R. Francis Brisbois, George E. Moran and C. E. Northrup, 510 Nevahoe Avenue, to manufacture locks and locking devices.

The Kalamazoo Spring & Axle Co., Kalamazoo, Mich., has filed notice of change in organization, to operate with a capital of \$100,000.

H. P. and A. X. Gaukler, Franklin Boulevard, Pontiac, Mich., have filed plans for a one-story foundry, 40 x 100 ft., on Lake Street and the Grand Trunk Railroad, to cost about \$17,000.

The Briscoe Devices Co., Pontiac, Mich., has been incorporated with a capital of \$300,000 by B. J. Cleaver, Emil D. Moessner, Pontiac, and William J. Decker, Detroit, to manufacture carburetors, ignition equipment and other automobile apparatus.

The Gabriel Steel Co., Detroit, has increased its capital from \$250,000 to \$375,000.

The Board of Education, Saginaw, Mich., is planning for the installation of machine shop, metal-working, wood-working and electrical equipment at the vocational school, to be erected at a cost of about \$1,000,000.

The Stearns-Detroit Automobile Co., 1084 East Jefferson Street, Detroit, has taken bids for a one-story addition to its service and repair building, 74 x 200 ft., to cost about \$60,000.

The Wright-Fisher Bushing Co., Detroit, has been incorporated with a capital of \$75,000 to manufacture automobile bushings and other machined products. It recently acquired property at Holly, Mich., where it proposes to build a new plant. The incorporators are Eugene Greenfield, W. R. Fisher and W. Renen, 457 Winfield Avenue. Mr. Fisher is president.

The Michigan Wire Goods Co., Niles, Mich., manufacturer of wire cloth, etc., has increased its capital from \$30,000 to \$75,000.

The Zenith Foundry Co., Miller Avenue, Detroit, is taking bids for a new one-story foundry, 90 x 200 ft.

A petition has been filed in the Circuit Court, Oakland, Mich., for the dissolution of the Pontiac Body Co., Pontiac, Mich. Its plant was sold some time ago to the General Motors Corporation.

## Milwaukee

MILWAUKEE, NOV. 29.

In the absence of any sizable business machine tool production has declined further the past 10 days. Only small forces are required to fill current orders. Outside dealers report that while the demand is very dull and spotty, some bright spots have appeared in the last few days, serving to build up a more hopeful sentiment. Milling machine manufacturers are looking forward to some requirements from railroad sources during December. The Waukesha Motor Co., Waukesha, Wis., which has taken a large contract to furnish motor truck power units, has fairly large milling machine needs in a list of about \$100,000 worth of tools for which inquiry is now being put out in various markets.

The Northern Boiler & Structural Iron Works, Appleton, Wis., has increased its authorized capitalization from \$30,000 to \$100,000 to cover extensions made and to finance additional equipment purchases from time to time. William H. Timm is president and general manager.

The International Harvester Co., 784 Park Street, Milwaukee, has tentative plans for a new assembling and warehouse building to be erected on Reed Street, near the Chicago & Northwestern tracks. It will be of reinforced concrete, brick and steel, with steel sash, 100 x 150 ft. The date of commencing construction is still indefinite, but the project will mature within two years. Paul F. Schryer is general superintendent of the Milwaukee works.

The Automatic Cradle Mfg. Co., Stevens Point, Wis., which recently moved into its own plant, is increasing its authorized capitalization from \$100,000 to \$300,000. It manufactures cradles with automatic rocking attachments. J. J. Bukolt is president and general manager.

The Gold Seal Storage Battery Co., Green Bay, Wis., has been incorporated with a capital stock of \$300,000 and will build a plant early next year for the manufacture of accumulators. The incorporators are F. J. Mankin, E. J. Bolza and T. J. Best. Details of the project have not been given out.

F. J. Thrun, Eagle River, Wis., is purchasing equipment for a new machine shop, one-story, 60 x 150 ft., to be ready March 1. The investment will be about \$17,500.

W. A. Platt, Baraboo, Wis., is moving his jobbing machine shop from the old Gollmar garage into a new building, 50 x 125 ft., one-story and part basement. Some additional equipment is being purchased.

The Antigo Tractor Co., Antigo, Wis., which was incorporated a year ago with \$500,000 capital, instead of erecting a plant has acquired the buildings and equipment of the Murray-Mylrea Co., Antigo, founder and machinist. A limited output of Four Wheel Pull tractors has been accomplished in recent months under contract with the Murray-Mylrea Co. Possession will be given Dec. 1, when improvements and retooling will be undertaken by the new owner. Charles W. Fish is president of the tractor company.

The Duplex Storage Battery Co., Milwaukee, organized a year ago in Wisconsin with \$60,000 capital, has reincorporated in Delaware with an authorized capitalization of \$350,000, of which \$70,000 is invested in this State. It recently moved from Milwaukee to Beaver Dam, Wis., where it occupies the remodeled factory of the former Beaver Dam Mfg. Co. Peter Kettenhofen, formerly general superintendent Beaver Dam Malleable Range Co., has become associated with the Duplex company. William Petschel is president and chief engineer.

The Kiel Machine Co., Kiel, Wis., is purchasing additional equipment from time to time to increase its output of agricultural implements, gas engines and farm wagons. A 20-ft. engine lathe, radial drill, bolt cutter and several other tools are now being installed.

The Eagle River Lumber Co., Eagle River, Wis., will build a power plant addition and install a new 200-hp. boiler and other equipment.

The Manitowoc Shipbuilding Co., Manitowoc, Wis., will build a new locomotive shaft costing about \$40,000, accommodating fourteen locomotives for repairs and overhauling. Equipment also will be installed for repairing freight cars.

The Board of Education, Marinette, Wis., has engaged Derrick Hubert, architect, Menominee, Mich., to design a junior high and vocational training school, estimated to cost \$300,000, including manual training and other shop equipment. Paul F. Neverman is city superintendent of schools.

The P & J Motor Co., Cudahy, has been chartered in

Wisconsin with a capital stock of \$250,000 to manufacture gas engines, automobiles, motor trucks, materials, parts, etc. The incorporators are represented by Charles B. Quarles, 68 Wisconsin Street, Milwaukee, attorney.

The Anchor Shipbuilding Co., Washburn, Wis., has placed its new shipyard and dock in operation. It will build wooden vessels exclusively for the present. New equipment is being installed, including the construction of two oil-burning furnaces for plate and angle work. Three additional slips will be built during the winter. Robert Curr is general manager.

The General Ignition & Battery Co., 347 Florida Street, Milwaukee, is erecting a two-story addition, 50 x 65 ft., for manufacturing and repairing electrical automotive devices, storage batteries, etc. Fred Geyer is president.

The American Toy Co., Marinette, Wis., contemplates the erection of a new two-story factory and boiler house, 50 x 144 ft., costing about \$45,000. The architect is Derrick Hubert, Krenz Building, Menominee, Mich.

## The Gulf States

BIRMINGHAM, NOV. 29.

The Goodwear Tire & Belt Co., 223 Bedell Building, San Antonio, Tex., is completing plans for its new plant, 70 x 120 ft. The first unit will be supplemented by additions later. H. L. Fullerton is president.

Fire, Nov. 18, destroyed the cotton compress plant of the Exporters & Traders Compress Co., Merlin, Tex., with loss estimated in excess of \$250,000, including equipment.

The Texas Boiler & Sheet Iron Works, Inc., Wichita Falls, Tex., has been incorporated with a capital of \$50,000 by J. F. Hagan, W. L. Dalton and R. M. Leffingwell, to manufacture boilers and similar products.

The Four-One Box Co., Mawry and Quitman streets, Houston, Tex., recently organized, has acquired a local building to specialize in the manufacture of wire-bound boxes. It is planned to install machinery at once for a daily output of about 2000 boxes. Carroll T. Sherman is president and manager.

The Texas Boiler Works, Dallas, Tex., has acquired a local site for new works. Plans are under way and it is proposed to remove the present plant to the new location upon completion of the buildings. New equipment for increased production will be installed.

C. G. Mayo, Santa Rosa Sawmill Co., Bagdad, Fla., is planning to reopen the Santa Rosa Shipyard at this location for the production of sea-going barges. Small vessels of other type will also be constructed.

Bids for refinery buildings and machinery for its new plant at Palatka, Fla., will be asked early next year by the United Sugar Corporation, 1512 Walnut Street, Philadelphia, estimated to cost with equipment about \$1,000,000. George P. Anderton, Alexandria, Va., is architect and construction engineer. H. W. Johns, vice-president and manager, Box 42, Palatka, is in charge.

D. J. Garrison Co., Inc., 505 Dyal-Upchurch Building, Jacksonville, Fla., has been incorporated with a capital of \$50,000 to manufacture gas and gasoline engines and parts. D. J. Garrison is head.

Fire, Nov. 19, destroyed a portion of the service building of the Consolidated Motor Co., Birmingham, with loss estimated at about \$100,000.

The Standard Oil Co. of Louisiana, Baton Rouge, La., has increased its capital from \$10,000,000 to \$30,000,000 for expansion.

Fire, Nov. 24, destroyed the cotton compress plant of the Columbia Compress Co., Magnolia, Ark., with loss, including equipment, estimated in excess of \$100,000.

The Graham Tool & Machine Co., Graham, Tex., recently organized with a capital of \$75,000 to manufacture oil-well tools and machinery, is planning for the erection of a factory. A. C. Perry, Ranger, Tex., heads the company.

The Pecos Reservoir Irrigation Co., Imperial, Tex., has been incorporated with a capital of \$250,000 by J. M. Simmons, J. H. McKee and R. H. Gray.

The Winnsboro Light & Ice Co., Winnsboro, Tex., has been incorporated with a capital of \$60,000 and will build an electric light plant and ice factory. The incorporators are Mrs. K. A. Campbell, R. C. Campbell and Mrs. J. W. Rhone.

The Corona Oil Co., Tampico, Mexico, a subsidiary of the Royal Dutch-Shell interests, will build an 8-in. pipe line from its wells in the Zacamixtle field to its terminal at Tampico, a distance of about 75 miles, and will install four pumping plants. The improvements will cost approximately \$5,000,000.

D. C. Nelson, Fort Worth, and associates will build an oil refinery at some point on the Cisco Northwestern Railroad with a daily capacity of 1000 bbl.

## Cleveland

CLEVELAND, Nov. 29.

The volume of inquiry has improved, but little business is being placed. The American Steel & Wire Co. has deferred purchases against its list of 21 machines issued two weeks ago, but it is expected that it will become active again around the first of the year. An inquiry has come from Indianapolis for 32 machines, including seven lathes, three grinding machines, two vertical and one horizontal boring mills and three drilling machines. The Wellman-Seaver-Morgan Co., Cleveland, is lining up equipment for the manufacture of tractor motors, but may not make purchases for some time. The Ohio Locomotive Crane Co., Bucyrus, Ohio, which recently issued a list of 53 machines, is expected to place orders shortly.

Most of the inquiry is for used machines, the supply of which is quite plentiful. In addition to other used machinery being placed on the market, a large amount is being disposed of at the Erie, Pa., plant of the American Brake Shoe & Foundry Co.

The Universal Machine Co., Bowling Green, Ohio, expects to place its addition in operation about Dec. 15. It is a brick and steel structure, 95 x 200 ft., one section of which will be used for a heat-treating department and part of the remainder for a power plant. An addition to the old plant is being erected for a hammer department.

Rorick & Widman, who have been operating a machine shop in Bucyrus, Ohio, have dissolved partnership and August E. Widman will continue the business alone. He is erecting a new shop, 30 x 40 ft.

The Monarch Foundry Co., Lima, Ohio, has placed in operation a new foundry for making light grey iron castings. F. Z. Demster, former president of the Lima Steel Castings Co., is president; F. A. Smith, vice-president, and J. H. Davison, secretary and treasurer.

The Pennsylvania Furnace & Stove Co., Warren, Pa., is enlarging its plant by the erection of an addition, 60 x 120 ft., which will be completed shortly.

The W. S. Tyler Co., Cleveland, has placed contract for a four-story brick, steel and reinforced concrete building to be erected on East Thirty-sixth Street, near its present plant, at a cost of approximately \$250,000.

The Matthews Mfg. Co., Monroe and King streets, Sandusky, Ohio, manufacturer of isolated electric lighting plants, will commence erection at once on an addition, 100 x 150 ft., to cost about \$75,000.

The Smith & Patten Motor Sales Co., Defiance, Ohio, is having plans prepared for a one-story addition, 144 x 144 ft., for the manufacture of automobile tops and bodies, estimated to cost about \$200,000, including machinery. A. M. Strauss, Shoaff Building, Fort Wayne, Ind., is the architect.

## Baltimore

BALTIMORE, Nov. 29.

The Wizard Check Indorser & Printing Machine Co., Inc., Calvert Building, Baltimore, has engaged F. A. Fletcher, 407 North Charles Street, as architect for its new plant in the Orangeville district. The entire works, as projected, will cost close to \$1,000,000. F. S. Weise is president.

The property of the United Fire Brick Co., North East, Md., has been purchased by Joseph Condon at a private receiver's sale. The new owner is understood to be planning for continuance of operations.

The Triangle Oil Corporation, 433 Title Building, Baltimore, has been incorporated with a capital of \$2,000,000 by James G. Pugh, Howard T. Martin and Joseph P. Reynolds, to construct an oil refinery.

The Navy Department, Bureau of Yards and Docks, Washington, is taking bids for a new power house at the Government plant, Annapolis, Md.

Electric traveling cranes, hoisting and loading machinery, conveying equipment, etc., will be installed at the proposed new docks and piers to be constructed by the City Council, Baltimore. A bond issue of \$12,500,000 has been approved.

The Bartlett-Hayward Co., Scott and McHenry streets, Baltimore, manufacturer of machinery, etc., has taken title to property at Clare and Wilcomico streets, concluding purchases of sites in this section. It is said that the company will use the land for extensions to its South plant.

The Navy Department, Bureau of Yards and Docks, Washington, has awarded contract to the Boyle-Robertson Construction Co., Evans Building, for a new naval experimental research plant, near Bellevue, D. C., to cost about \$652,700, including equipment.

The Electric Hose & Rubber Co., Twelfth and Race streets, Wilmington, Del., manufacturer of metal reinforced hose for railroad and general service, will hold in abeyance the erection of its proposed three-story building, estimated to cost about \$18,000.

W. W. Griffith, First and N streets, Washington, has awarded a contract to E. H. Mosher, Munsey Building, for a new plant for the manufacture of motor truck equipment and parts.

The Du Pont Securities Co., Wilmington, Del., has been incorporated by Pierre S. du Pont and associates with capital of \$7,000,000 to operate automobile manufacturing plants in different parts of the country. It has acquired control of the General Motors Corporation, Detroit, and its subsidiary automobile and truck manufacturing plants. Officers of the new company are: Pierre S. du Pont, president; George H. Gardner, vice-president, and John J. Raskob, secretary and treasurer.

Jefferson Palmer, 207 South Church Street, Charlotte, N. C.; W. A. Anthony and Charles N. Leigh, are organizing a company with capital of \$50,000 to manufacture vending machines, slot machine parts, etc.

The State Highway Commission, Raleigh, N. C., is planning for the erection of machine and repair shops to cost about \$75,000. W. S. Falis is State highway engineer.

A. K. McLellan, Dillon, S. C., is planning to rebuild his cotton ginning plant, recently destroyed by fire with loss estimated at \$65,000.

The Lexington Laboratory Supply Co., Inc., 210 East Lexington Street, Baltimore, has been incorporated with \$22,000 capital stock to manufacture instruments, apparatus, etc. The incorporators are Edward F. Peroutka, Kerner F. and Courtney F. Brown.

## Indiana

INDIANAPOLIS, Nov. 29.

Bids on general equipment for the new plant of the Wawasee Tire & Rubber Co., Elkhart, Ind., will be taken by R. L. Simmons, architect, 411 Monger Building, early next year. The building will be three or four stories, 175 x 175 ft., and is estimated to cost about \$500,000.

The Universal Slag, Brick & Tile Co. of Indiana, Gary, has increased its capital from \$500,000 to \$1,000,000. Plans are under way for a new plant, one-story, 100 x 140 ft., estimated to cost about \$200,000 with machinery. Bids will be taken at an early date. The Silica Brick & Tile Co., West Fifty-ninth Avenue and Sixty-sixth Street, Chicago, is interested in the company. Joseph M. LeVee, 673 Broadway, Gary, is architect.

The Oliver Chilled Plow Co., South Bend, Ind., has commenced the erection of the superstructure for its new one and two-story foundry addition.

A new one-story crushing plant, 40 x 100 ft., for handling pigment ore, will be erected at a cost of about \$50,000 by the American Pure Paint Co., 575 Connecticut Street, West Gary, Ind., on Clark Road. Plans have been filed.

The Hercules Corporation, Evansville, Ind., has been incorporated with \$8,000,000 capital stock. It is a consolidation of the Hercules Buggy Co., Hercules Wheel Co., Hercules Body Mfg. Co., Indiana Color & Varnish Co. and the Hercules Gas Engine Works. The directors are William H. McCurdy, president; J. D. Craft, C. G. Talbott, L. H. McCurdy and A. H. Loeb.

The Norstrom Mfg. Co., Cromwell, Ind., has been incorporated with \$500,000 capital stock to manufacture telephone lockouts and accessories. The directors are N. E. Norstrom, C. E. Seymour, W. R. Wright, M. L. Hussy and J. C. Kimball.

The Engman-Mathews Range Co., which is moving from South Bend, Ind., to Goshen, Ind., will have its plant in operation by the first of the year. It cost \$250,000 and will have an annual capacity of 15,000 ranges.

The Northwestern Machine Co., 601 Wilmington Street, Indianapolis, has increased its capital stock from \$5,000 to \$25,000.

The Pony Tractor Co., Laporte, Ind., has increased its capital stock from \$100,000 to \$500,000.

The North American Storage Battery Co. has leased 17,000 sq. ft. of floor space at 40 West Pratt St., Indianapolis, where it will establish a plant. The officers are: President, H. E. Von Grimmerstein; vice-president, M. O. Smith; treasurer, C. E. H. Johnson; secretary, W. E. Bushong.

T. A. Parey, 917 Conwell Street, Connorsville, Ind., is building new works and is in the market for complete machine shop and foundry equipment.



## Cincinnati

CINCINNATI, Nov. 29.

Some manufacturers report a fair volume of inquiry the past week, a small percentage developing into orders, mostly for single machines, however, and for widely scattered points. A few railroad orders are being placed, the Pennsylvania having taken three boring mills. Mining companies have also been in the market and dealers state business from this source is good. The Lafayette Motor Car Co., Indianapolis, has issued a tentative list of tools and it is expected that purchases will be made shortly after the first of the year. Other lists pending are those of the Big Four and Santa Fe railroads. Local manufacturers for the most part are running full time and orders on books will keep them busy until the first of the year. Some plants have cleared up back orders and have reduced the weekly schedule from forty-eight to forty hours. Every effort will be made to keep organizations intact through the dull period, as a revival of business is expected early in the year. More cancellations are reported, some being for export. In most cases slow deliveries are given as the reasons, but other buyers state that financial conditions are the cause.

The crane market is fairly active. The Eagle-Picher Co. is in the market for a 5-ton, and the Bourne-Fuller Co., through its Cleveland office, has sent out specifications for three cranes for its new Cincinnati warehouse. It is expected that only one, a 5-ton, 65-ft. span, traveling crane, will be purchased now.

Local jobbing foundries are generally operating on a 50 per cent basis. Stove foundries, however, are running full time and have enough orders booked to operate at capacity for several months.

The Philip Carey Mfg. Co., Cincinnati, will call a meeting of stockholders for Dec. 27 to consider a proposal to increase the common stock by \$6,000,000. It manufactures roofing materials and additions are contemplated.

The National Shale Brick Co., Martinsburg, W. Va., has completed plans for the erection of a plant near that city and it is expected that work will be started at once. It is proposed to have the plant in operation about March 1, 1921.

The Allsteel Tire & Rubber Co., Dayton, Ohio, was recently incorporated with a capitalization of \$250,000. In addition to the manufacture of tires and inner tubes, it plans to manufacture a new metallic air bag used in the vulcanizing of tires. It is understood that a new plant will be erected in Artyr Park, a suburb, work on which will begin after the first of the year. Andrew Huettner is president.

Carl Pletz & Sons, manufacturers of special machinery, have removed from their old plant at 717 Sycamore Street, Cincinnati, to new quarters at 3116 Spring Grove Avenue. It will be incorporated as a stock company and in addition to their present lines, it is understood will build tool room lathes.

The Cincinnati Auto Spring Co., Cincinnati, affiliated with the Maremont Mfg. Co., 1600 Laffin Street, Chicago, has awarded contract to the Pabert Sheet Metal Co., Cincinnati, for its new plant on Reedy Street.

The Williamson Heater Co., West Fifth Street, Cincinnati, manufacturer of hot air furnaces, etc., has taken out a permit for its one-story addition, 60 x 120 ft., to cost about \$45,000.

## The Central South

ST. LOUIS, Nov. 29.

The United States Register Co., 510 West Fifth Street, St. Louis, is taking bids for a new three-story and basement building, 40 x 105 ft., at 330-32 West Fifth Street.

The St. Louis & San Francisco Railroad Co., St. Louis, has awarded a contract to the William McDonald Construction Co., Odd Fellows' Building, for the erection of new shops and engine house, totaling 100 x 250 ft., to cost about \$58,000.

The T. J. Moss Tie Co., Security Building, St. Louis, manufacturer of railroad ties, has plans under way for new works at East St. Louis, Ill., to include an industrial railroad, estimated to cost about \$100,000.

The R. P. Rice Motor Sales Co., 3822 Broadway, St. Louis, will hold in abeyance until next spring the erection of its proposed three-story service building, 60 x 120 ft., at Fourteenth Street and Baltimore Avenue, estimated to cost about \$200,000.

Fire, Nov. 20, destroyed the branch plant of the Turner, Day & Woolworth Handle Co., Memphis, Tenn., with loss, including machinery, reported at \$100,000. Headquarters of the company are at 1217 South Seventh Street, Louisville.

The Cole Engineering Co., Chattanooga, Tenn., recently organized to manufacture special lubricating metals, has

acquired a site for its new plant, to cost about \$25,000. F. C. Cole is president.

The Stafford Roller Bearing Car Truck Co., Clarksville, Tenn., recently organized, is considering preliminary plans for new works. Leo K. Stafford heads the company.

The Chattanooga Plow Co., Carter and Main streets, Chattanooga, Tenn., manufacturer agricultural implements, has awarded contract to the Turner Construction Co., 242 Madison Avenue, New York, for a new one and two-story plant, 100 x 250 ft. Newell Sanders is president.

The Eclipse Electric Machinery Co., Thirty-first and Madison streets, Louisville, Charles E. Willey, president, is having plans prepared by Murphy & Brother, Louisville, for a new factory to cost about \$22,000.

The Coll Coal Co., Madison, Ky., is planning to rebuild its tippie, recently destroyed by fire.

The O. K. Stove & Range Co., 1511 South Brook Street, Louisville, has awarded contract to Morrison & Bennett, 1813 West Oak Street, for a one-story addition, 60 x 200 ft.

The Power Truck & Tractor Co., Goldsmith and Beard streets, Detroit, will defer the erection of its proposed plant on Mead Street, St. Louis, until next spring. The factory will consist of several one-story buildings, each about 50 x 250 ft., and is estimated to cost in excess of \$500,000 with machinery. P. G. Craven, 1235 Syndicate Trust Building, St. Louis, is local representative.

The Missouri-Pacific Railroad Co., St. Louis, associated with the Wabash Railway and Cotton Belt Route, St. Louis, has acquired about 145 acres in the vicinity of East St. Louis, Ill., for a new locomotive and car construction and repair plant, estimated to cost in excess of \$4,000,000 with machinery. The first unit will be equipped for the repair of freight cars, the second, for the construction of steel underframes for wooden cars; the third, for repairing and rebuilding steel cars, and the fourth, for repairing and rebuilding locomotives. It is said that the plant will give employment to about 5000 when fully operating. Those directly interested include B. F. Bush, president Missouri-Pacific Railroad; W. C. Maxwell, vice-president Wabash Railway, and R. A. Herbert, president of the Cotton Belt Route.

The Lenoir City Car Works, Lenoir City, Tenn., is completing plans for a new one-story building, 62 x 120 ft., for journal bearing production and other affiliated work. The installation will include revolving furnaces, boring machines, metal separators, etc.

The Tulsa Structural Steel Co., 204 Seaman Building, Tulsa, Okla., has taken over the plant and business of the Carter-Meyer Co., manufacturer of iron and steel products, at Sand Spring, Okla., which will be continued at this location.

The Midco Refinery Co., Tulsa, Okla., is considering the erection of a new plant, with initial capacity of about 6,000,000 bbl.

The Electrical Appliance Co., Louisville, has been incorporated with a capital of \$25,000 by J. T. Noe, Louisville; B. C. Wilson, Frankfort, Ky., and Henry C. Anderson, Lexington, Ky., to manufacture electrical apparatus.

The Louisville & Nashville Railroad Co., Louisville, has had plans prepared for the erection of new shops and engine house in the vicinity of Baxter, Ky.

The Nashville Tire Co., Nashville, Tenn., manufacturer of automobile tires, has increased its capital from \$50,000 to \$200,000.

The Illinois Thresher Co., Syracuse, Ill.; Racine Plow Works, Racine, Wis., and the Morris Machinery Co., Wichita, Kan., have awarded contract to John Wenzel, 430 South Water Street, Wichita, for a one-story building, 108 x 150 ft., at Wichita and Lawrence streets, Wichita, for joint occupancy. It will cost about \$30,000.

The Economy Thresher Co., Bartlesville, Okla., has been incorporated with a capital of \$100,000 by L. A. Rowland, G. E. Richmond and W. W. Lowe, Bartlesville, to manufacture threshers and other agricultural machinery.

The A. J. Harwi Hardware Co., Ninth and Commercial streets, Atchison, Kan., is having plans prepared for a new five-story brick and reinforced-concrete building, 75 x 150 ft., to cost about \$150,000. W. Saylor & Co., 360 Mutual Building, Kansas City, Mo., are architects.

The Devonian Coal Co., Allen, Ky., recently organized, is planning for the erection of a coal tippie at its local properties.

The Gunther City Coke, Coal & Mining Co., Nowata, Okla., C. B. Cordes general manager, is in the market for machinery, steam shovels, boilers, engines, electrical equipment, etc.

C. O. Frye & Son, Tulsa, Okla., will equip a plant at Sand Springs, Okla., for the manufacture of Portland cement.

The Power Truck & Tractor Co., Detroit, Mich., will erect

a plant at St. Louis to manufacture trucks and tractors. B. B. Craven, Chemical Building, St. Louis, in charge.

The Oklahoma Lubricating Oil & Refining Co., Oklahoma City, Okla., F. Walls, B. F. Pace and others interested, are in the market for about \$60,000 worth of refinery equipment.

## California

LOS ANGELES, Nov. 23.

The A. G. Faulkner Co., Los Angeles, has arranged for the erection of a new two-story machine shop and automobile service works, 53 x 175 ft., at Union Avenue and Washington Street.

The Consolidated Refractories Co., Los Angeles, has been incorporated, with a capital of \$100,000, by H. H. Scott, F. E. Agnew and C. M. Knudson, to manufacture fire brick and other refractory products.

The Novelty Electric Sign Co., 165 Eddy Street, San Francisco, manufacturer of electric signs, has leased a one-story and basement building to be erected at 435-37 Turk Street, for extensions.

The Washington Iron Works, 1924 Sacramento Street, Los Angeles, has awarded contract to the Stebbins & Duer Co., 401 South Grand Avenue, for an addition, 32 x 90 ft.

The Stewart Electric Mfg. & Sales Co., Los Angeles, has been incorporated, with a capital of \$250,000, by R. E. Stewart, L. M. and C. M. Parker, to manufacture electrical products.

The Oliver Mfg. Co., Fourth and Madison streets, Oakland, Cal., manufacturer of engines, pumps, etc., has filed plans for a one-story building, to cost about \$15,000.

Refrigerating machinery, electric motors, power plant equipment and other mechanical apparatus will be installed in the cold storage plant to be erected by the Pacific Fruit Express Co., 65 Market Street, San Francisco, a subsidiary of the Southern Pacific Railroad Co., on San Fernando Road, Los Angeles. It will be reinforced concrete, 106 x 150 ft., and is estimated to cost about \$100,000.

The Seacraft Corporation of California, Los Angeles, has been incorporated, with a capital of \$250,000, by H. E. Roach, R. R. Thomas and E. A. Featherstone, to manufacture seaplanes and other aircraft.

The Tyler Electric Co., 3716 West Sixth Street, Los Angeles, has filed notice of organization to manufacture electrical specialties. A. S. Tyler, 2949 West Fifteenth Street, heads the company.

The Los Angeles Railway Co., Pacific Electric Building, Los Angeles, has plans under way for the erection of two new automatically operated electric plants to cost about \$100,000, including machinery.

The Atlas Automobile Works, Los Angeles, have awarded contract to the Bavin & Burch Co., 173 East Jefferson Street, for a two-story machine shop and service building 70 x 190 ft., on Hope Street, to cost about \$30,000.

Fire, Nov. 7, destroyed the San Francisco Welding & Brazing Works, 131 Beale Street, and the adjacent building of the California Machine Co., with a loss of \$75,000.

The United Iron Works, Second and Clay streets, Oakland, Cal., has purchased adjoining property and plans to increase its capacity.

The Bethlehem Shipbuilding Corporation, Ltd., Alameda, Cal., has completed plans for the erection of a one-story machine shop addition to cost about \$30,000.

The Gaylord Foundry Co., 2601 East Twenty-sixth Street, Los Angeles, has filed notice of organization to manufacture iron and steel castings. Robert H. Gaylord, 1814 Virginia Road, heads the company.

The Tunison Motor Co., Oakland, Cal., has been incorporated with a capital of \$2,500,000 to manufacture automobiles. A site will be selected in this vicinity for a new works and plans prepared at an early date. Those interested in the company include: C. W. Lineker, I. W. Green and James M. Oliver, Oakland, and Elbert W. Davis, Berkeley.

The Los Angeles Spring & Forge Co., 1948 South Los Angeles Street, Los Angeles, has filed notice of organization to manufacture steel springs and other specialties. George Meade and Reese Evans head the company.

The Great Western Power Co., San Francisco, is perfecting plans for the erection of its proposed hydroelectric generating plant on the Feather River, near Oroville, Cal., and proposes to place the project under way at an early date. With machinery it is estimated to cost about \$5,000,000.

The Auto Machine Co., 303 East Ninth Street, Los Angeles, has filed notice of organization to manufacture automobile parts and operate a general machine works. Clark R. Stanford, 628 North New Hampshire Street, heads the company.

## The Pacific Northwest

SEATTLE, Nov. 23.

Industrial activities continue quiet, with an extreme hesitancy manifested toward new buying. Railroad repair work and new construction in this district have fallen off and the dullness incident to the holidays has developed earlier than usual.

The Seaboard Machine Works, Seattle, is establishing a plant on the West Waterway which will be equipped for overhauling locomotives and building and repairing marine machinery. The main structure will be 50 x 100 ft. P. A. Haley is president.

The F. E. Chalmers Co., Tacoma, plans the erection of a sawmill and box factory to cost \$50,000. Work will be undertaken immediately.

The Colby Steel & Engineering Co., Portland, has increased its capital stock from \$20,000 to \$50,000.

N. B. Gordon, et al., Wenatchee, Wash., plans the installation of a gravity water system costing \$50,000 for irrigating 1500 acres.

The Vancouver Specialty Mfg. Co., Vancouver, Wash., has been incorporated for \$300,000 by Fred Dundee, R. W. Hedges and others, to manufacture refrigerators and specialties.

The Downs-Osborne Co., Sedra Woolley, Wash., manufacturer of tractor plows, has leased a site near the city on which will be erected the first unit of its new plant. The main structure will be 75 x 130 ft.

The Wrangell Mining, Pulp & Power Co., Wrangell, Alaska, has been incorporated for \$1,000,000 by William D. Grant, Donald Sinclair and others to supply electric power for mining operations.

The plant and pattern shop of the Vulcan Mfg. Co., Seattle, were damaged by fire recently with loss of \$6,000.

The Lakeview Chamber of Commerce, Lakeview, Ore., has purchased a 60-acre tract near the city for the erection of a \$300,000 box factory for the Lakeview Box & Lumber Co. J. E. Campbell represents the company.

The Todd Shipyards, Tacoma, have been awarded contract by the Navy Department for the construction of a 10,000-ton transport to cost \$3,935,000 and to be completed in 20 months. It will be 484 ft. long, with 64 ft. beam.

## Canada

TORONTO, Nov. 29.

A fair demand exists for tools for replacement purposes, but large buying is lacking. The call for small tools has also fallen off and sales are more limited than for many months. While there has been much talk of price cutting, most dealers are of the opinion that it would not make any difference to sales, as only those urgently in need of machinery are buying. Dealers have been looking for the Canadian railroads to enter the market with good-sized lists, but so far none has appeared. Firms handling Canadian high-speed tools are working on the new price lists announced last week. This schedule puts them on an equal footing with British manufacturers, who have heretofore been able to undersell tools made in Canada.

The Huron Specialty Casting Co., Goderich, Ont., is contemplating establishing a foundry and manufacturing plant and is asking the city to erect a building, sell it to the company and grant the usual exemption from taxes.

A company in which B. L. Banford is interested will be incorporated to take over a factory at Listowel, Ont., and install new equipment at a cost of \$50,000 for the manufacture of steel, wire and wooden wheels.

The Sterling Action & Piano Co., Toronto, acting for an English company has purchased a block of land at the corner of Church and Newcastle streets, New Toronto, where it is proposed to erect a factory for the manufacture of musical instruments, accessories, etc.

The United Rubber Mfg. & Reclaiming Co., Ltd., 1189 Bathurst Street, Toronto, Ont., will build an addition to cost about \$50,000.

Philip Gies, Water Street, Kitchener, Ont., is erecting an addition to his foundry at a cost of \$30,000.

The repair shop and machinery owned by the Pontiac Lumber & Pulp Co., Makenick, Que., was destroyed by fire with a loss of \$25,000.

P. A. Beaulieu, 37 Bourlamarque Street, Quebec, will build a brass foundry at a cost of \$50,000.

The Moto-Motor Co. of Canada, Ltd., Hamilton, Ont., has been incorporated with a capital stock of \$25,000 by James S. Lovell, 25 King Street West; Charles D. Magee, 300 St. George

Street; William Bain and others, all of Toronto, to manufacture machinery, automobile parts, etc.

The Flexible Shaft Co., Ltd., Toronto, has been incorporated with a capital stock of \$40,000 by Richard W. Hart, 67 Yonge Street; Charles H. C. Leggett, 116 Arundel Avenue; Lewis A. McHugh and others, to manufacture power transmission machinery and appliances, tools, etc.

The plant and equipment of the Williams Mfg. Co., Ltd., 1789 St. James Street, Montreal, in liquidation, Walker H. H. Savage, receiver, is offered for sale. It is now in operation and consists of a five-story machine shop, 50 x 100 ft.; four-story machine shop, 40 x 187 ft.; wood-working shop, two stories, 50 x 78 ft.; gray iron foundry, 70 x 176 ft.; and office building.

The Canadian Hanson & Van Winkle Co., Toronto, have completed an addition to its foundry for handling gray iron castings for the machine trade.

The Andrews Wire Works of Canada, Ltd., Watford, Ont., is building an addition to its plant which will provide an additional 10,000 sq. ft. of floor space.

A. F. Stewart, engineer, Moncton, N. B., is receiving bids for the construction of a 350-ton mechanical coaling plant at Chaudiere Junction, Que., for the Canadian National Railways, Moncton.

The Page-Hersey Tubes, Ltd., 100 Church Street, Toronto, is in the market for a 50-hp. horizontal return tubular boiler, to operate at 60 lb. pressure.

The Canadian Elgin Watch Co., Ltd., Toronto, has been incorporated with a capital stock of \$250,000 by David I. Grant, 632 Bank of Hamilton Building; Mervil MacDonald, Edwin Smily and others to manufacture watches, clocks, jewellers' machinery, etc.

The Mutual Totalizer Co., Ltd., Toronto, has been incorporated with a capital stock of \$100,000 by George R. Sproat, 59 Yonge Street; John C. Thomson, William T. Jones and others to manufacture pari-mutuel wagering machines, tools, etc.

Modern Implements, Ltd., Walkerville, Ont., has been incorporated with a capital stock of \$100,000 by Charles D. Donaven, William J. Davidson, Thomas S. Biggar and others to manufacture implements, tractors, tools, etc.

The Waltham Grinding Wheel Co. of Canada, Ltd., Brantford, Ont., has been incorporated with a capital stock of \$200,000 by James Chisholm, Thomas B. McQuesten, Norman R. Robertson and others, all of Hamilton, to manufacture grinding wheels, tools, etc.

The Sarnia Cement Products, Ltd., Point Edward, Ont., has been incorporated with a capital stock of \$100,000 by Walter D. Reid, George R. McGee, both of Point Edward; William J. Barber, Frederick R. Reeves of Sarnia, Ont., and others, to manufacture Portland cement, etc.

I. Johnson & Son., Ltd., Toronto, has been incorporated with a capital stock of \$60,000 by Hugh J. McLaughlin, 120 Bay Street; William T. Sinclair, 19 Tennis Crescent; Leopold Macaulay and others to manufacture machinery, tools, iron, steel, patterns, etc.

The Quebec Brass Foundry, Des Prairies and Valler streets, Quebec, has awarded contract for the erection of a brass foundry costing \$13,000 to Telesphore Guay, St. Leon Street, Bienville, Levis, Que.

The Frost & Wood Co., Ltd., Smith's Falls, Ont., is in the market for a 10-hp. General Electric or Westinghouse motor, 60 cycle, three-phase, 440 volts, 1200 r.p.m.

## OFFICE CHANGES

Richard Smethurst & Co., appraisal and production engineers, Cincinnati, have moved their offices from the Atlas National Bank Building to the Mercantile Library Building.

The Precision & Thread Grinder Mfg. Co., manufacturer of the multi-graduated precision grinder, has moved its offices to No. 1 South Twenty-first Street, Philadelphia, where it will maintain a machinery display department, showing, in addition to their grinders, the Craley master toolmaker, Miller radius and angle wheel dressers for toolroom and production work, the Herrmann snap thread gages, and other tools and accessories.

C. E. Halback & Co., ornamental iron and steel work, have removed their offices from 23 East Twenty-sixth Street, New York, to their new factory at 189 to 193 Banker Street, Brooklyn.

Baird & Martin, Inc., steel mill representative, has changed the firm name to Baird, Lasker & Co., Inc. The offices at 120 Liberty Street are continued.

## IRON AND INDUSTRIAL STOCKS

### Market Has Become Unsettled Once More, but Money Situation Is Easier

Notwithstanding the money situation, particularly in the Eastern section of the country, gives unmistakable signs of growing easier, the market for iron and industrial stocks has become unsettled once more, and most of the gains established early last week are lost. In explanation, it is said the revision in prices by independent steel companies and the continued liquidation of cotton, grains and other foodstuffs, have made their impress on the speculative mind. In addition, it is pointed out in financial circles that selling to establish losses for taxation purposes, and selling of securities to raise liquid cash have continued on a fairly liberal scale. Small denominations of Liberty bonds, purchased by workers during the war, also are finding their way on the open market.

Bankers, however, are of the opinion that the woolen, leather, cotton and other fundamental industries, as well as the stock market have been thoroughly liquidated, and as soon as the year-end dividend, interest and tax disbursements are out of the way, general business will begin to improve. This opinion is substantiated by the manner in which prices for stocks snap back when the selling pressure relaxes. Quiet accumulation by important interests of seasoned dividend paying iron and industrial stocks is progressing. The character of buying of automobile and steel shares is better of late.

The range of prices on active iron and industrial stocks from Saturday of last week to Monday of this week was as follows:

Allis-Chalm. com.	29½-31½	Lake Sup. Corp.	8½-10
Allis-Chalm. pf.	71-73	Midvale Steel....	31¼-34½
Am. Can. com....	24-28	Nat-Acme .....	28¼-30
Am. Can. pf.....	77-80½	Nat. E. & S. com.	46¼-48½
Am. C. & F. com.	122-125½	Nat. E. & S. pf....	-88
Am. C. & F. pf....	107-108	N. Y. Air Brake.	84-87
Am. Loco. com....	81½-86	Nova Scotia Stl..	3½-38
Am. Loco. pf.....	101½	Pittsburgh Stl. pf.	-84
Am. Stl. F. com.	29-31½	Press. Steel com.	78-84
Am. Stl. F. pf....	83½-84½	Press. Steel pf....	93-94
Bald. Loco. com.	93½-99½	Ry. Stl. Spg. com.	82½-85½
Bald. Loco. pf....	-99	Ry. Stl. Spg. pf....	-104
Beth. Steel com....	52½-55	Replogle Steel....	73-80½
Beth. Stl. Cl. B.	53½-58	Republic com....	65-69½
Beth. Stl. 8% pf.	101-102½	Republic pf.....	89-90½
Case, J. I. pf....	-83	Sloss com.....	53-56
Chic. Pneu. Tool.	60-70	Superior Steel...	41-46
Colo. Fuel .....	28½-30½	Tran.-Williams...	41-42
Cruc. Steel com...	36½-100	Un. Alloy Steel...	32-34½
Cruc. Steel pf....	83-86	U. S. Pipe com...	10½-12
Gen. Electric ...	122½-126½	U. S. Pipe pf....	41¼-45
Gt. No. Ore cert.	29½-32	U. S. Steel com...	81-84½
Gulf States Steel.	34½-37	U. S. Steel pf....	106-106½
Int. Har. com....	92½-96½	Vanadium Steel...	41½-49½
Int. Har. pf.....	103-105	Va. I. C. & Coke	90-91
Lackawanna Stl..	51-54½	Westingh. Elec...	41½-44

### Railroad Financing

WASHINGTON, Nov. 30.—The Minneapolis & St. Louis Railroad Co. has asked permission from the Interstate Commerce Commission to issue 36 notes of \$5,055.55 each to apply on the purchase of 100 refrigerator cars, at a total cost of \$227,500. The Cincinnati, New Orleans & Texas Pacific Railway Co. has asked permission to assume the obligation and liability as lessee of the Cincinnati Southern Railway to pay the interest on an issue of \$3,500,000 of municipal gold bonds of the city of Cincinnati and to pay a further sum of one per cent per annum to provide a sinking fund for their redemption at maturity, July 1, 1965. Assumption of the obligation is necessary as part of a financial arrangement to meet the cost of construction of a new railroad bridge over the Ohio River at Cincinnati.

### Industrial Finances

The Fore River Shipbuilding Corporation, Quincy, Mass., a subsidiary of the Bethlehem Steel Corporation, has reduced its capitalization from 10,000 shares having an aggregate par value of \$1,000,000, to 10 shares having an aggregate par value of \$1,000. Of the original 10,000 shares, 7500 were outstanding.

The Massachusetts Iron & Steel Co., Boston, has reduced its capitalization from \$500,000 to \$400,000 by the retirement at par and accrued dividends of \$100,000 of preferred stock. Carl P. Dennett is president of the corporation, and Harry F. Stimpson, treasurer.

The Carbon Steel Co., Pittsburgh, suffered a deficit, after charges, taxes and preferred dividends, of \$276,400 for the year ended Sept. 30, against a surplus of \$1,446,261 for the year before. A total income of \$149,946 for this year compares with one of \$5,193,345 for the preceding year. Inventory has increased from \$1,134,092, as of Sept. 30, 1919, to \$1,609,184, as of the same date this year.



# Current Metal Prices

On Small Lots, from Merchants' Stocks, New York City

The quotations given below are for small lots, as sold from stores in New York City by merchants carrying stocks.

As there are many consumers whose requirements are not sufficiently heavy to warrant their placing orders with manufacturers for shipment in carload lots from mills, these prices are given for their convenience.

## Iron and Soft Steel Bars and Shapes\*

Bars:	Per Lb.
Refined iron, base price.....	5.00c.
Swedish bars, base price.....	20.00c.
Soft steel bars, base price.....	3.48c. to 4.15c.
Hoops, base price .....	4.18c. to 5.50c.
Bands, base price .....	5.68c. to 6.00c.
Beams and channels, angles and tees	
3 in. x ¼ in. and larger, base.....	3.58c. to 4.15c.
Channels, angles and tees under 3 in. x	
¼ in., base.....	3.48c. to 4.15c.

\*The low prices are those of the Carnegie Steel Co. and are subject to a cartage charge of 15c. per 100 lb. in the Metropolitan district and 10c. per 100 lb. to local points in New Jersey.

## Merchant Steel Per Lb.

Tire, 1½ x ½ in. and larger.....	4.15c.
(Smooth finish, 1 to 2½ x ¼ in. and larger).....	4.65c.
Toe calk, ½ x ¾ in. and larger.....	5.00c.
Cold-rolled strip (soft and quarter hard).....	12c. to 14c.
Open-hearth spring steel .....	6.50c. to 10.00c.
Shafting and Screw Stock:	
Rounds .....	6.25c. to 7.00c.
Squares, flats and hex.....	6.75c. to 7.50c.
Standard cast steel, base price.....	15.00c.
Best cast steel .....	20.00c. to 24.00c.
Extra best cast steel.....	25.00c. to 30.00c.

## Tank Plates—Steel

¾ in. and heavier.....	3.78c. to 4.15c.
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## Sheets

	Blue Annealed	Per Lb.
No. 10 .....	4.68c.	to 6.15c.
No. 12 .....	4.73c.	to 6.40c.
No. 14 .....	6.25c.	to 6.45c.
No. 16 .....	6.35c.	to 6.55c.

## Box Annealed—Black

	Soft Steel C.R., One Pass Per Lb.	Wood's Refined, Per Lb.
Nos. 18 to 20.....	7.90c. to 8.30c.	.....
Nos. 22 and 24.....	7.95c. to 8.35c.	9.80c.
No. 26 .....	8.00c. to 8.40c.	9.85c.
No. 28 .....	8.10c. to 8.50c.	10.00c.
No. 30 .....	8.20c. to 8.75c.	.....

No. 28, 36 in. wide, 10c. higher.

## Galvanized

	Per Lb.
No. 14 .....	8.60c. to 9.10c.
No. 16 .....	8.85c. to 9.25c.
Nos. 18 and 20.....	9.00c. to 9.40c.
Nos. 22 and 24.....	9.15c. to 9.55c.
No. 26 .....	9.30c. to 9.70c.
No. 27 .....	9.45c. to 9.85c.
No. 28 .....	9.60c. to 10.00c.
No. 30 .....	10.10c. to 10.50c.

No. 28, 36 in. wide, 20c. higher.

## Welded Pipe

Standard Steel			Wrought Iron		
	Blk.	Galv.		Blk.	Galv.
½ in. Butt....	—34	—17	¾-1½ in. Butt.	—	3+17
¾-3 in. Butt.	—38	—22	2 in. Lap.....	+	3+21
3½-6 in. Lap.	—33	—18	2½-6 in. Lap..	+	1+17
7-12 in. Lap..	—23	—6	7-12 in. Lap....	+	12+30

## Steel Wire

	Per Lb.
Bright basic .....	8.00c.
Annealed soft .....	8.00c.
Galvanized annealed .....	8.75c.
Coppered basic .....	8.50c.
Tinned soft Bessemer .....	10.00c.

\*Regular extras for lighter gages.

## Brass Sheet, Rod, Tube and Wire

### BASE PRICE

High brass sheet .....	25¼c. to 26c.
High brass wire .....	26¼c. to 27c.
Brass rod .....	23¼c. to 25c.
Brass tube .....	41¼c. to 43c.

## Copper Sheets

Sheet copper, hot rolled, 24 oz., 26½c. to 27½c. per lb. base.

Cold rolled, 14 oz. and heavier, 2c. per lb. advance over hot rolled.

## Tin Plates

Bright Tin	Grade	Grade	Coke—14x20	Primes	Wasters
	"AAA"	"A"			
	Charcoal	Charcoal			
	14x20	14x20			
IC.....	\$14.50	\$12.25	80 lb....	\$9.80	\$9.55
IX.....	16.75	14.25	90 lb....	9.90	9.65
IXX....	18.50	16.00	100 lb....	10.00	9.75
IXXX...	20.25	17.75	IC....	10.25	10.00
IXXXX...	21.75	19.50	IX....	11.25	11.00
			IXX...	12.25	12.00
			IXXX...	13.25	13.00
			IXXXX...	14.25	14.00

## Terne Plates

8-lb. Coating 14 x 20

100 lb. ....	\$9.35
IC .....	9.50
IX .....	10.50
Fire door stock.....	12.75

## Tin

Straits pig .....	39c.
Bar .....	44c. to 49c.

## Copper

Lake ingot .....	16¼c.
Electrolytic .....	16¼c.
Casting .....	16¼c.

## Spelter and Sheet Zinc

Western spelter .....	8¾c. to 9c.
Sheet zinc, No. 9 base, casks.....	14c. open 14¼c.

## Lead and Solder\*

American pig lead.....	7¾c. to 8¼c.
Bar lead .....	9c. to 10c.
Solder, ½ and ½ guaranteed.....	29c.
No. 1 solder.....	26¼c.
Refined solder .....	22¼c.

\*Prices of solder indicated by private brand vary according to composition.

## Babbitt Metal

Best grade, per lb.....	80c.
Commercial grade, per lb.....	40c.

## Antimony

Asiatic .....	7½c. to 8¼c.
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## Aluminum

No. 1 aluminum (guaranteed over 99 per cent pure), in ingots for remelting, per lb.... 35c. to 38c.

## Old Metals

The market is unsettled, with lower prices prevailing. Dealers' buying prices are nominally as follows:

	Cents Per Lb.
Copper, heavy and crucible.....	11.50
Copper, heavy and wire.....	10.50
Copper, light and bottoms.....	9.25
Brass, heavy .....	7.00
Brass, light .....	4.75
Heavy machine composition.....	11.00
No. 1 yellow brass turnings.....	6.00
No. 1 red brass or composition turnings.....	8.75
Lead, heavy .....	4.50
Lead, tea .....	3.25
Zinc .....	3.75

0  
0  
25  
00  
75  
00  
00  
75  
50  
25  
75

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